

REVIEW OF SIGNIFICANT TRADE IN ANIMAL SPECIES INCLUDED IN CITES APPENDIX II

Detailed reviews of 37 species

Draft report to the CITES Animals Committee

May 1999

Prepared by the

World Conservation Monitoring Centre
IUCN Species Survival Commission
TRAFFIC Network



INTRODUCTION/METHODOLOGY

The CITES Secretariat contracted the World Conservation Monitoring Centre (WCMC), working in conjunction with the IUCN/SSC Wildlife Trade Programme and the TRAFFIC Network, to undertake a review of the status, use, trade and relevant protection measures with respect to 37 species selected by the Animals Committee for Phase IV of the Significant Trade Review Process. The contract was issued to WCMC in late November 1998, and work under this project undertaken during December 1998-May 1999.

All range States for the species concerned were provided with information available on the species at the start of the review, including CITES annual report data and draft species summary sheets. This information was sent with an accompanying letter from the CITES Secretariat, which included a request for information relevant to the review to be sent to WCMC. The Secretariat sent a follow-up letter requesting such information in February 1999.

WCMC, IUCN/SSC and TRAFFIC obtained information from documents on file and relevant literature. WCMC undertook a search of on-line bibliographic databases, TRAFFIC offices undertook regional literature searches to identify additional references.

IUCN/SSC collected information from members of the IUCN Species Survival Commission and other experts. The TRAFFIC Network similarly sought information from experts within range States for the species concerned as well as in consumer countries.

WCMC compiled and conducted an initial analysis of CITES annual report data, followed by a more detailed review by TRAFFIC. TRAFFIC obtained additional CITES data in East and Southern Africa, and collected information on the value of wildlife in trade through a review of pricelists and other sources.

WCMC drafted information sheets for each of the 37 species based on the information collected by the three organisations. All sheets were then reviewed and commented upon by SSC and TRAFFIC, and modifications made where agreed.

The first drafts of all species review sheets were translated by the Secretariat into French and Spanish according to the languages of the range States. These drafts were sent to all range States for review and comment during March-April 1999. WCMC produced second drafts incorporating comments received from range States. On the basis of the information in the second drafts, IUCN/SSC, TRAFFIC and WCMC jointly developed conclusions regarding the effects of international trade as required under Decision 10.79. These conclusions and supporting text were incorporated by WCMC into the review sheets provided to the Secretariat for circulation to the Animals Committee.

We hope that the information provided here will be useful to the Animals Committee in supporting improved implementation of CITES Article IV.

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Galagoides demidoff (Fischer 1806)

Demidoff's Dwarf Galago
Gálago enano
Galago de Demidoff

Order: MAMMALIA

Family: GALAGONIDAE

SUMMARY

A widely distributed species in West and Central Africa, with the eastern limits of its distribution still unclear. Its status is poorly known because of its nocturnal habits but, where surveys have been carried out, it was found to be generally common. If the number exported from Togo remains within the currently agreed quota of 25 animals, it is unlikely that the species will be threatened by current international trade.

The species is recommended under Decision 10.79 for inclusion in category d (iii).

The taxonomy followed here is that adopted by Groves (1993). Thus *G. thomasi*, which is now generally regarded as a separate species sympatric with *G. demidoff*, is treated as conspecific. In fact, Groves (1993) noted that 'Nash et al. (1989) recognized *G. thomasi*, Elliot, 1907, as a full species, partially sympatric with *demidoff*' and it is, therefore, unclear why he continued to regard it as conspecific. Bearder (1999) noted that *G. demidoff* and *G. thomasi* differ in habitat, vocalisations, anatomy, ecology, behaviour, chromosome numbers and DNA sequences. Groves (1993) also treated various isolated populations in Tanzania as conspecific with *demidoff*. *G. orinus* from the Uluguru Mountains is included here, but the other populations have subsequently been described as new species and are not considered further here, viz. *G. rondoensis* Honess and Bearder 1996 from Lindi and Mtwara Districts, and *G. udzungwensis* Honess and Bearder 1996 from the eastern side of the Udzungwa, Uluguru and East Usambara Mountains. These two new species were found to be more similar to *G. granti* (= *G. zanzibaricus granti* in Groves, 1993) than to *G. demidoff*.

DISTRIBUTION AND POPULATION

Hill and Meester (1977) recognised seven subspecies:

G. d. anomurus Pousargues, 1893. Right bank of Congo River from headwaters of Shari system southward to Panga on middle Aruwimi. Note: Includes *medius* as a synonym.

G. d. demidoff. Forest belt of upper Guinea between Senegal and Niger Rivers. Includes *Otolicnus peli* and *Mioxicebus rufus* as synonyms.

G. d. murinus (Murray, 1859). Forest belt of lower Guinea from Niger River to Congo River, and inland into Congo (K.), exact limits unknown. Includes *pusillus* as a synonym.

G. d. orinus (Lawrence and Washburn, 1936). Known only from type locality, Bagilo, Uluguru Mountains, Tanzania. Note: Includes *Galago gallarum cocos* Allen and Loveridge, 1927 (Not Heller, 1912) as a synonym.

G. d. phasma Cabrera and Ruxton, 1926. Forested area of left bank of Congo River.

G. d. poensis (Thomas, 1904). Fernando Poo [= Bioko].

G. d. thomasi (Elliot, 1907) Central region of Ituri Forest and forest zone of Central African Rift and adjacent parts of Uganda as far east as the Mabira forest (Curry-Lindahl, *in litt.*), eastward to Lake Victoria and Victoria Nile. This is probably the form occurring in Tanzania and Kenya. Includes *matschiei* as a synonym.

Note that Groves (1993) treated *matschiei* as a separate, unrelated species in the genus *Galago* and regarded *cocos* as a synonym of *G. zanzibaricus*. Jenkins (1987) treated *murinus* and *phasma* as synonymous with the nominate race. Nash et al. (1989) stated that *thomasi* was sympatric with *demidoff* over the entire range of the former, except for the Angolan Highlands.

Lee et al. (1988) noted that the population sizes of *G. d. thomasi* are unknown. They considered that it might be common in some forests in Uganda, but is generally rare throughout eastern forests. T. Butynski (*in litt.* to IUCN/SSC Trade Programme, 1999) noted that this species is 'often common where found' but was 'probably often misidentified in trade, in museum collections, as well as in zoological and research collections'.

Angola: *G. d. thomasi* occurs in the Loanda Highlands (Nash *et al.*, 1989). Jenkins (1987) listed two specimens of *G. d. demidoff* from N'dala Tando (9°15'S 14°52'E) and Dundo, near Luachimo River, Lunda District (7°24'S 20°47'E).

Benin: Sayer and Green (1984) noted that several specimens in the possession of an animal dealer in Cotonou had been obtained from forested areas in the south.

Burkina Faso: Recorded by Roure (1968).

Cameroon: *G. d. thomasi* occurs on Mt Cameroun (Nash *et al.*, 1989). Bearder and Honess (1992) found both *G. demidoff* and *G. thomasi* in Korup National Park. Both were sometimes found together but *demidoff* favoured low branches (below 5 m) in secondary forest, whereas *thomasi* spent much time in the canopy of primary forest. Jenkins (1987) listed many specimens from a number of localities around the country. Also recorded by Struhsaker (1970).

Central African Republic: Pousargues (1893) described *G. d. anomurus* from the Kemo River, and Jenkins (1987) listed two specimens from Zemio, Niam Niam country.

Congo: Dowsett-Lemaire and Dowsett (1991) found that it was very numerous in the Kouilou basin. Dowsett-Lemaire and Dowsett (1997) found it in Odzala National Park. Malbrant and Maclatchy (1949) recorded it in a number of different areas of the country. Wilson and Wilson (1991) found skins and a skull for sale at a bush-meat market at Pointe-Noire in the south-west.

Democratic Republic of the Congo: Known in the region between Dilolo and Kolwezi in the south, and in the Kivu and Ituri regions in the east (Nash *et al.*, 1989). Rahm (1966) recorded it at Irangi, and between Shabunda and Kalima, in the east. Jenkins (1987) listed a number of specimens from various localities.

Côte d'Ivoire: Recorded by Bourlière *et al.* (1974) in the Lamto region.

Equatorial Guinea: Listed by Cabrera (1929) from the area. Thomas (1904) described the subspecies *poensis* from Bioko.

Gabon: Charles-Dominique (1974) found it at an average density of 50 per km² in the Ipassa Reserve. Blom *et al.* (1992) found it at Lopé, Moukalaba and Ipassa and classified it as not threatened, but questionably. Wickings *et al.* (1998) recently found *G. thomasi* occurring sympatrically with *G. demidoff* in the Haut-Ogooué region.

Gambia: Jenkins (1987) listed one specimen without locality details.

Ghana: Jenkins (1987) listed a number of specimens from seven localities.

Guinea: Common in the Sérédou region (Roche, 1971).

Kenya: Jenkins (1987) listed three specimens of *G. d. thomasi* from Mt Marsabit, but Lee *et al.* (1988) were doubtful of its occurrence in the country.

Liberia: Recorded by Allen and Coolidge (1930) and Kuhn (1965).

?Malawi: Listed as occurring by Lee *et al.* (1988) and Groves (1993) but unlikely to be correct.

Mali: Vincent (1969) listed it as occurring.

Nigeria: Happold (1986) described it as fairly common and widely distributed throughout the country.

Rwanda: Present (Kavanagh and Bennett, 1984).

Senegal: Probably extinct (Dupuy, 1971).

Sierra Leone: Teleki (1980) found it in Outamba-Kilimi, the Kangari Hills, the Loma Mountains and Mamunta-Mayoso. Jenkins (1987) listed seven specimens from five localities.

Tanzania: Lawrence & Washburn (1936) described *G. d. orinus* from Bagilo in the Uluguru Mountains.

Togo: Vincent (1969) listed it as occurring.

Uganda: Common (Bere, 1962). Jenkins (1987) listed specimens of *G. d. thomasi* only.

HABITAT AND ECOLOGY

The species occurs in a wide variety of montane and lowland forests, including secondary forests, typically in areas of dense vegetation. It is nocturnal and insectivorous, with a secondary reliance on gums or resins, and eating some seeds and fruits (Kingdon, 1971). It makes untidy leaf nests from ground level up to 18 m in the vegetation, and these may be shared by three to four animals. Home ranges of females are about 0.8 ha, and there is often overlap in the ranges of adjacent females; in contrast, home ranges of males are up to 2.7 ha and do not normally overlap with those of other males (Happold, 1986).

THREATS TO SURVIVAL AND DOMESTIC USE

T. Butynski (*in litt.* to IUCN/SSC Trade Programme, 1999) noted that this species 'is not much affected by trade overall'. P. Honess (*in litt.* to IUCN/SSC Trade Programme, 1999) noted that there were very

low levels of local use for pets and medicine. *G. (d.) thomasi* was categorised as Insufficiently Known in *Threatened Primates of Africa* (Lee *et al.*, 1988) because of widespread deforestation of montane and central-eastern forests.

Congo: Wilson and Wilson (1991) found some skins and a skull for sale for traditional medicines.
Gabon: Blom *et al.* (1992) regarded the threat from hunting and habitat destruction to be small.

INTERNATIONAL TRADE

About 850 individuals of this species were reported in trade from 1991 to 1996, virtually all which were reported as live wild animals imported to Japan (89%) and originating in Togo. The export quota of 25 animals set for Togo in 1995 appears to have been exceeded by 980% by the reported trade in that year. Note that most of this trade was reported by Japan, but not by Togo. In 1994 Japan reported importing 360 from Togo (export permit numbers recorded in Japan's CITES data indicate that 190 of these were traded with 1993 export permits and 170 with 1994 export permits), whereas Togo reported exporting only 180 to Japan - still 155 over the quota of 25. In 1995 Japan reported importing 240 from Togo (30 apparently with 1994 permits and the remainder with 1995 permits), whereas Togo reported exporting 5 to Japan. This was not the case in 1996, when both Togo and Japan reported the trade from Togo to Japan of only 25 individuals. The other importers of live animals were the USA, Spain, Russia, and Slovakia. The only trade in captive-bred specimens reported was 2 specimens imported by France from the USA.

There are no records of *G. demidoff* having been used as laboratory animals / for medical research in Japan (S. Matsubayashi, Primate Research Institute of Kyoto University, *in litt.*, to TRAFFIC East Asia - Japan, March 1999). In 1992 a Japanese TV cartoon programme featured a bush baby *Galagoides senagalensis* as the hero. Dr. S. Kodera, Director, Japan Monkey Centre, noted that it was possible that this programme gave rise to the popularity of small primates in Japan including *G. demidoff* which are sold as pets (TRAFFIC East Asia - Japan, *in litt.*, to TRAFFIC International, March 1999).

Gross exports of *Galagoides demidoff*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	total	average
BOD		DE	2	0	0	0	0	0	2	0.3
LIV		TG	90	25	15	449	245	25	849	141.5
SKE		NL	1	0	0	0	0	0	1	0.2
SPE		US	0	0	0	2	0	2	4	0.7
TRO		CM	0	0	1	0	0	0	1	0.2

T. Butynski (*in litt.* to IUCN/SSC Trade Programme, 1999) pointed out that, although the species is easily identified in the field on the basis of its calls, once captured it would be difficult to identify from morphological features. He suspected that individuals of the genus *Galagoides* were probably often misidentified in trade, in museum collections, as well as in zoological and research collections.

CONSERVATION MEASURES

Gambia: Fully protected.

Nigeria: International trade prohibited since 20 April 1985 (CITES Notification No. 874).

Togo: An export quota of 25 animals was set for each year from 1995-1999 (CITES Notifications Nos. 874, 916, 994, 1998/36, 1999/21).

CAPTIVE-BREEDING

P. Honess (*in litt.* to IUCN/SSC Trade Programme, 1999) referred to limited captive-breeding taking place.

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Hippopotamus amphibius Linnaeus, 1758

Hippopotamus
Hipopótamo anfibio
Hippopotame

Order: ARTIODACTYLA

Family: HIPPOPOTAMIDAE

SUMMARY

The hippopotamus occurs throughout much of sub-Saharan Africa. The results of a survey published in 1993 suggested that the species was relatively secure with an estimate of the total population of 157,000 animals. However, it was considered that it had decreased in many countries within its range, but this decline was at least partly due to anthrax epidemics. International trade involves ivory (canine and incisor teeth) and skins but it is difficult to determine the number of animals involved because of different reporting procedures used by the Parties. The main range States involved in the trade of teeth/tusks were Tanzania, where the species has a stable population; the Democratic Republic of the Congo, where it is decreasing but may still number 30,000; and Zambia, where it is increasing. The export of 1,189 skins from Botswana in 1994 reported by the USA, if correct would be of concern, given that the total population of the country may have been no more than 1,600 in 1993. However, there has been no evidence that this trade has continued, since the only reported exports from Botswana in 1995 and 1996 were 25 ivory carvings.

The species is recommended under Decision 10.79 for inclusion in category d (iii).

DISTRIBUTION AND POPULATION

Eltringham (1993a) summarised the status of the species, stating that it still occurred widely throughout its range of sub-Saharan Africa, although its distribution was far from even. He considered it to be relatively secure within its range and a conservative estimate of the whole population in Africa was of the order of 157,000 animals. The survey results indicated that numbers had decreased in many areas.

Grubb (1993) recognised five subspecies, but pointed out that it had not been reviewed in recent years and, that without examination of further species it was not possible to say whether the diagnostic skull characters were any more than peculiarities of particular specimens:

H. a. amphibius Said to occur in Egypt (where it is now extinct) south to Sudan, northern Democratic Republic of the Congo and Ethiopia, and west to Gambia; also Tanzania and Mozambique. (Including *senegalensis* Desmoulins, 1826; *abyssinicus* Lesson, 1842; *typus* Duvernoy, 1846 according to Ansell, 1971).

H. a. tschadensis Schwarz, 1914 Chad and Nigeria. Globally categorised by IUCN (1996) as 'Vulnerable'.

H. a. kiboko Heller, 1914 Kenya and Somalia.

H. a. constrictus Miller, 1910 Angola, southern Democratic Republic of the Congo, and northern Namibia.

H. a. capensis Desmoulins, 1825 Zambia south to South Africa. (Including *australis* Duvernoy, 1846).

Eltringham (1993a) is the most recent review of the status of the species throughout its range. The relevant details for each country from this review are quoted below, followed by the assessment of the population trend, also from this review. Additional information is provided from more recent references, and from other references that usefully elaborate on, or qualify, that given by Eltringham.

Angola: 'No information has been received from Angola. According to Sidney (1965), the hippopotamus was widespread throughout Angola particularly in the east on the Cunene, Cubango, Cuando, Cuanza, Longa, and Zambezi Rivers.' (Eltringham, 1993a). Decreasing.

Benin: 'The group of contiguous countries, Ivory Coast, Ghana, Togo, Benin, and Burkina Faso, contain a total of, at most, 2,000 hippopotamus with the majority in Burkina Faso.A further group is found on the Pendjari River system bordering Benin. This numbered about 500 in 1979 but only some 280

remained in 1987. The Mono River between Benin and Togo supported a small but stable population of 53 in 1986.' (Eltringham, 1993a). Decreasing.

Sayer and Green (1984) noted its occurrence in small numbers in all major rivers and throughout the length of the Ouémé, Alibori, Mekrou and Pendjari rivers, where 488 individuals were counted in January 1979; however, in March-April 1979 at least 98 of these died for reasons that were not clear.

Verschuren (1988) found that it was not widespread, with the majority of animals restricted to the W National Park in the north.

Botswana: 'Botswana is also too dry for hippopotamus except in the north of the country, where some occur in the Okavango Delta and in the Chobe/Linyati River system. A few (18+) exist on the Limpopo in the east. Outside this area, a small population may still exist near Ghanzi although some observers think this is unlikely. C. A. Spinage puts the total in northern Botswana at 1,600 in the wet season and 500 in the dry.' (Eltringham, 1993a). Decreasing.

Population estimates were: 2,014 (1987); 2,921 (1989-1991) and 1,760 (1992-1993) (Traill-Thompson, J., *in litt.*, to TRAFFIC East/Southern Africa, 1998).

Burkina Faso: 'The group of contiguous countries, Ivory Coast, Ghana, Togo, Benin, and Burkina Faso, contain a total of, at most, 2,000 hippopotamus with the majority in Burkina Faso. There have been no recent counts except on the Comoé River on the border with the Ivory Coast, where 720 were recorded in 1989' (Eltringham, 1993a). Decreasing.

Burundi: 'Hippopotamus occur in Burundi on the Malagarazi, Ruvubu, and Rusizi Rivers but there are conflicting reports over numbers. P. Chardonnet reports good populations numbered in hundreds and P. C. Trenchard puts the total on these rivers as over 1,000 as a conservative estimate. K. M. Doyle, however, casts doubt on these figures, for along a 120 km stretch of the Ruvubu River where several hundred were reported by P. Chardonnet, he recorded only 39 hippopotamus, all but two within the Ruvubu National Park, although there may have been more in wallows etc., away from the river, which were not surveyed.' (Eltringham, 1993a). Unknown trend.

Cameroon: 'Hippopotamus were also once numerous in Cameroon but the only information obtained during the present survey was from the Korup National Park, where signs of the species are common around the confluence of the Miri and Bake Rivers although sightings are few. It is likely that the species does not occur in the Bake River much further upstream than Bajo although some traces were found as far up as Bakut.' (Eltringham, 1993a). Unknown trend.

Central African Republic: 'At least 150 hippopotamus (possibly as many as 1,500) are known to exist in the Central African Republic in addition to an unknown number in Bamingui-Bangoran National Park, where 136 were counted in 1973 although now there are probably only 20 to 30 present.' (Eltringham, 1993a). Decreasing.

Chad: IUCN/SSC and TRAFFIC Network (1994) gave a population estimate of 400 individuals. The Director of Forests and Protection of the Environment, Chad, noted that hippopotamuses disappeared from their water courses following civil unrest in 1979. Those hippopotamus which did survive were seriously affected by the drought in 1984 (*in litt.*, to the CITES Secretariat, July 1996). Further investigation into the current population status is required.

Congo: 'No counts have been made in the Congo but the species is reported by one correspondent to be widely distributed and numerous on suitable rivers but another reports its presence on only one, the Nyanga River.' (Eltringham, 1993a). Decreasing.

Dowsett and Dowsett-Lemaire (1991) found that the hippopotamus had almost disappeared from the Kouilou Basin. Dowsett and Dowsett-Lemaire (1997) found very small numbers subsisted along the Lékoli and Mambili rivers in the Odzala National Park.

Democratic Republic of the Congo: 'Hippopotamus have a wide distribution in Zaire including some in the northwest of the country although most are in the east, where they occur around Epulu and Wamba and along some of the larger rivers in the Ituri Forest. Other populations occur on the Zaire River

(Yangabi), Bomu River and elsewhere in several national parks including Garamba, Kundelungu, Salonga, Upemba and Virunga. The last mentioned contains the greatest concentration with a total of 22,875 estimated from a 1988 aerial count made by C. Mackie, who with K. Hillman Smith recorded 2,851 in Garamba National park in 1988. In round figures, these counts suggest a total of some 26,000 hippopotamus for the two parks. Numbers elsewhere in Zaire probably do not amount to more than a few thousand, perhaps bringing the country-wide total up to about 30,000.' (Eltringham, 1993a). Decreasing.

Aerial surveys in the Virunga National Park, which reportedly held the largest single population of the species, indicated a 50% decline in numbers from 1989, when the population was estimated at 22,875, to 1994, when it was estimated at 10,849 animals (Languy *et al.*, 1994). A 1990/1991 anthrax epidemic was believed to be responsible for the death of 700-1,000 hippos and the decline was attributed to other factors, particularly increased demographic pressure and a decrease in the level of protection (J. P. d'Huart in IUCN Species Survival Commission and TRAFFIC Network, 1994).

Côte d'Ivoire: 'The group of contiguous countries, Ivory Coast, Ghana, Togo, Benin, and Burkina Faso, contain a total of, at most, 2,000 hippopotamus with the majority in Burkina Faso.' (Eltringham, 1993a). Decreasing.

Anon. (1994) noted that it was believed to be present in small numbers in one reserve and three national parks, including Komoé, and present, but dispersed, in all of the major rivers (Komoé, Bandama, Sassandra); the total population was estimated at about 1,000 individuals.

Egypt: Extinct (Osborn and Helmy, 1980).

Equatorial Guinea: 'A few are found in neighboring Equatorial Guinea on the Campo River.' (Eltringham, 1993a). Unknown trend.

Eritrea: Not listed by Eltringham (1993a) but recorded by Hillman (1992).

Ethiopia: 'The species is also abundant between altitudes of 200 and 2,000 m in neighboring Ethiopia, where its main strongholds appear to be the Omo, Awash and Great Abbi (Blue Nile) Rivers. It also occurs in most of the larger lakes and as isolated populations in smaller swamps and pools. The few that occur in the dry south-east are confined to the Webi, Shebeli and Ganale Rivers. The northern limit of the species is the Setit River. No precise counts have been made recently but the hippopotamus is said to be numerous throughout its range.' (Eltringham, 1993a).

Gabon: 'Hippopotamus occur along most of the coastline of Gabon and for a considerable distance up the Ogooue River and although there are no recent estimates of numbers, they are said to be abundant in places.' (Eltringham, 1993a). Decreasing?

Malbrant and Maclatchy (1949) noted that it was common in many areas, but numbers had decreased in some rivers and was absent from the coastal basin north of the Equator.

Gambia: 'The Gambia contains no more than about 40 animals.' (Eltringham, 1993a). Decreasing?

A. Camara (in Anon., 1994) gave a population estimate of 50 to 100 individuals, and noted that it was continuing to decline.

Ghana: 'The group of contiguous countries, Ivory Coast, Ghana, Togo, Benin, and Burkina Faso, contain a total of, at most, 2,000 hippopotamus with the majority in Burkina Faso. Only remnant populations remain in Ghana.' (Eltringham, 1993a). Decreasing?

G. A. Punguse (in Anon., 1994) considered the species to be extremely rare, found in small numbers along the rivers, including the Black Volta and the Kulpawn, and perhaps along Lake Volta.

Guinea: 'The species is common on most of the rivers in Guinea...' (Eltringham, 1993a). Decreasing.

Anon. (1994) gave a population estimate of about 1,000.

In the north-east, Walsh (1987) found that hippopotamus numbers were dramatically reduced in 1984-1985 compared with those recorded in the 1960s.

Guinea-Bissau: 'Although small in area, Guinea Bissau supports a substantial population, which is particularly abundant on the islands of the Bijagos Archipelago and along the numerous inland rivers.' (Eltringham, 1993a).

Anon. (1994) claimed that it was only present in the Bijagos Archipelago and that the population did not exceed 1,000 individuals.

The Ministry of Agriculture and Rural Development for Guinea-Bissau further notes that Hippopotamus are often seen in the Curubal river in the east of the country although they have disappeared from a number of rivers due to habitat destruction. Hippopotamus are most abundant in the Curubal river and its tributaries (F. Correia, Ministério do Desenvolvimento Rural e Agricultura, Guinea-Bissau, *in litt.*, to CITES Secretariat, July 1996).

Kenya: 'The species occurs in most of the many suitable habitats throughout Kenya and some recent counts have been made in the Mara River area (2,132 in 1980), Lake Naivasha (220 in 1988) and along part of the Tana River between Osako and Adamson's Falls (220 in 1983) (Coe and Collins 1986; Karstad *et al.* 1980; Smart, *in litt.*). The Mara figure includes some from over the border in Tanzania.' (Eltringham, 1993a). Stable.

An earlier aerial count in 1971 (Olivier and Laurie, 1974) in the Masai Mara Game Reserve and the Serengeti National Park (Tanzania) estimated 1,927 hippos at an average density of 16.1/km.

Karstad and Hudson (1986) estimated the Mara population to be about 2,800 individuals. Anon. (1994) gave other major sites as Lake Victoria (1,650), Lake Turkana (400), delta of the Nyando, Yale and Tana (850), and Lake Naivasha (220).

C. Field (in IUCN Species Survival Commission and TRAFFIC Network, 1994) highlighted the decline of populations and range of the species. It was virtually extinct in Lake Turkana; about 200 remained in Lake Olbolossat; numbers had been significantly reduced in the Mara River; and, during 1994 droughts there had been a considerable increase in human-hippopotamus conflicts at Lakes Naivasha and Victoria.

Liberia: 'Kuhn (1965) cited an acceptable record of spoor from north of Zorzor, and K. F. Koopman (*in litt.*) has pointed out that the American Museum of Natural History has a specimen collected on the St. Paul's River, near Mount Coffee, in 1899' (Ansell, 1971). Probably now extinct (Eltringham, 1993a).

Malawi: 'Neighboring Malawi, although small, is also densely populated with hippopotamus, which occur on all rivers and lakes of sufficient size. The main concentrations are at Elephant Marsh (lower Shire River), the southwest arm of Lake Malawi, Upper Shire River and Lake Malombe in Liwonde National Park. R. H. V. Bell makes a guess that there are some 10,000 hippopotamus in the whole of Malawi.' (Eltringham, 1993a). Stable.

Anon. (1994) gave an alternative 1989 population estimate for the country of 6,569, and a stable population of 7,000 to 8,000 in 1994.

Bhima (1996) reported on a census of hippopotamus in the Upper Shire River, Malawi in 1993. An aerial count from the outlet of Lake Malawi to Zalewa Bridge produced an estimate of 1,234 compared with a 1989 figure of 1,202. The density was highest in Liwonde National Park (20.2 per km); in the rest of the river the density ranged from 4.6 to 6.8 per km. The high density in the park is clearly due to protection; elsewhere in the river densities have been kept lower by the conflict with humans. Mkanda (1994) discussed this aspect in more detail, and reported 1,579 hippos shot or wounded in Malawi between 1985 and 1989.

Population estimate for the Shire River system was 4,600 in 1997 (Irving and Irving, 1998).

Mali: 'There are probably less than 200 in Sierra Leone or Mali....' (Eltringham, 1993a). Unknown trend.

Anon. (1994) stated that it was not widespread, only occurring in the Baule Loop National Park.

Mauritania: Probably extinct (Eltringham, 1993a)

Anon. (1994) noted that its distribution was very limited, and that it might still be present in the Diaoulung Strict Nature Reserve.

Mozambique: 'A surprising number of hippopotamus appear to have survived in Mozambique, at least up to 1986, despite the recent civil strife. The species is still widely distributed throughout the country and is present on most river systems. Several national parks and reserves contain hippopotamus although only Gorongosa, with about 2,000, has a sizeable population. L. Tello's estimate made in 1986 puts the total at between 16,000 and 20,500 for the country as a whole with most (10,000-12,000) in the Zambezi Wildlife Utilization Area, which includes Marroneu Reserve and four safari hunting blocks. It is also contiguous with the Gorongosa National Park. This is the only region where numbers have increased (by some 20% since 1974). Elsewhere there has been a decline, except in Tete Province, whose population of between 1,500 and 2,500 is said to be stable.' (Eltringham, 1993a). Decreasing.

Smithers and Tello (1976) reported that it was common in Gorongosa National Park where the population was estimated to be about 3,500; on the Save River 250; the Maputo Game Reserve 50; the Marroneu Game Reserve 300; and between Zumbo, on the Zambezi River, and Cabora Bassa 641. They considered that it was on the decline in most other parts of the country.

Anderson *et al.* (1990) gave a 1990 population estimate for the Marroneu complex of 260.

Namibia: 'Namibia is too dry to support many hippopotamus except in the north, where the species is present in some numbers on the Cuando and Zambezi Rivers in the Caprizi Strip. Elsewhere it occurs along the boundary with Angola on the Okavango River.' (Eltringham, 1993a). Unknown trend.

Anon. (1994) stated that approximately 500 to 550 individuals have been observed in the country as a whole, and that the population was in decline.

Niger: 'Nigeria and Niger between them contain at least 400.' (Eltringham, 1993a). Decreasing.

Anon. (1994) provided an estimate of 100-150 individuals, all along the Niger.

Nigeria: 'Nigeria and Niger between them contain at least 400.' (Eltringham, 1993a). Decreasing.

Happold (1986) described the wider distribution of the species earlier in the century and noted that recent records have suggested that hippopotamuses now occur in fewer, more widely scattered localities than previously, and that their numbers are depleted. In some regions they had become extinct as, for example, in Owerri Province. He considered that there were only two localities where hippos were still common at that time: Yankari Game Reserve, where there were an estimated 170-200 individuals, and Kainji Lake National Park where about 50 individuals survived in the few stretches of the Oli River that had permanent water throughout the year.

Rwanda: 'A large population occurs on the Akagera River and associated lakes on the border between Tanzania and Rwanda but no recent count has been made. The total counted from the air in 1969 was 671 (Spinage *et al.* 1972). There are not many hippopotamus in the remaining East African countries of Rwanda and Burundi. Numbers on the Akagera River have been mentioned above in the section on Tanzania and there are probably still a few in wallows within the Akagera National Park or Mutara Game Reserve but no recent information has been received.' (Eltringham, 1993a).

Anon. (1994) gave a 1987 population estimate for the Akagera National Park of about 1,900, and noted that numbers appeared to have remained stable over the previous 20 years, except in the valley of the Akagera, where they had been severely reduced by poaching.

Senegal: 'The species is common....in the east and south of Senegal with an estimated country-wide population of between 500 and 700.' (Eltringham, 1993a). Decreasing.

Verschuren (1982) noted a population of less than 1,200 in the Niokola-Koba National Park and referred to poaching as the principal cause of the reduction of the numbers of animals.

Sierra Leone: 'There are probably less than 200 in Sierra Leone or Mali....' (Eltringham, 1993a). Decreasing.

Teleki (1980) found the species in the Outamba-Kilimi area and in the Loma Mountains.

Somalia: 'Very few hippopotamus remain in neighboring Somalia although some small groups have been reported on the lower Scebeli River and along the Juba River, where they are rather more numerous.' (Eltringham, 1993a). Decreasing.

This was presumably based on Fagotto (1985), who stated that in 1984 it was 'still present in the two main rivers of Somalia, and I have observed groups of 4-6 in the lower Scebeli (Giohar, Genale, etc.). Along the Juba they are more numerous. Nevertheless the reduction in numbers of this unique animal is evident.'

South Africa: 'Hippopotamus are confined to the northeast of the country in the Republic of South Africa, mainly in the Transvaal and the northern tip of Natal. Most of them are in the Kruger National Park in perennial rivers, dams and the larger pools of seasonal rivers. The total counted in the park in 1989 was 2,761 with 2,575 in rivers and 191 in dams and pools. R. H. Taylor gives a total (for 1986) of 1,264 for Natal and Kwazulu, with the largest concentration (595) on Lake St Lucia, but he suggests a better estimate of 1,423 averaged over the five years 1982-1986. Those in Natal outside the Kruger National Park are mainly confined to the large rivers in the eastern and northeastern regions of the province. These figures suggest that there are approaching 5,000 hippopotamus in the country as a whole.' (Eltringham, 1993a). Stable.

I. M. V. Jacobson (in Anon., 1994) gave a total population estimate of 5,300, with a slight decline in recent years as a result of severe droughts and reduced areas of suitable habitat.

Sudan: 'The hippopotamus occurs in southern Sudan on the Rivers Nile, Sobat and Jur south of Malakal and in several national parks and reserves. Other localities include the Sudd and tributaries of the Nile. There is no information on population sizes but it is said to occur in good numbers in most places.' (Eltringham, 1993a). Unknown trend.

J. M. Lock (in IUCN Species Survival Commission and TRAFFIC Network, 1994) gave a population figure of about 3,000 in the Sudd region in 1980.

Swaziland: Recorded in Milwane Game Sanctuary (Eltringham, 1993a) and occasionally in parts of the Lowveld (Skinner and Smithers, 1990).

Tanzania: 'Elsewhere in Tanzania hippopotamus are common in the Selous Game Reserve, where 1894 were counted on 115 km of the River Rufiji in 1987 (Samuels, *in litt.*). An estimate for the total population of the Selous in 1986 was 16,900 (with a standard error of 6,307) from an aerial sample count made by I. Douglas-Hamilton. Independent aerial counts in the Selous reported by Games (1990) returned figures of 15,483 in 1986, 24,169 in 1989 and 20,589 in 1990. The last total is a rather crude extrapolation from an observed figure of 6,866. A large population occurs on the Akagera River and associated lakes on the border between Tanzania and Rwanda but no recent count has been made. The total counted from the air in 1969 was 671 (Spinage *et al.* 1972). Hippopotamus are found in most other national parks and reserves of Tanzania and although not present anywhere in large numbers, the total probably amounts to several thousand more.' (Eltringham, 1993a). Stable.

Caro *et al.* (1998a) examined the effects of protection from human activities and the effects of hunting by tourists on the densities of large mammals. Aerial censuses revealed that mammal biomass per km² was highest in national parks. Hippopotamus were difficult to census, but densities were higher in protected areas than those that permitted settlement. The results showed that prohibition of human activity, backed up by on-site enforcement, maintained populations of ungulates such as the hippopotamus at relatively high densities. The idea that enforcement was effective only when spending was high was only true for species with a high economic value.

Caro *et al.* (1998b) examined the impact of tourist hunting on large mammals. Hunting by tourists is employed as a tool for habitat protection, and information on population sizes and hunting take. A total

of 392 hippopotamuses were killed by tourist hunters from 1988-1992, much less than 10% of the local population size, and suggesting that over-exploitation is unlikely.

Togo: 'The group of contiguous countries, Ivory Coast, Ghana, Togo, Benin, and Burkina Faso, contain a total of, at most, 2,000 hippopotamus with the majority in Burkina Faso. The Mono River between Benin and Togo supported a small but stable population of 53 in 1986.' (Eltringham, 1993a). Unknown trend.

Uganda: 'The principal concentrations of the species in Uganda are in the two large national parks, Murchison Falls and Queen Elizabeth. At one time the population in the latter park reached 21,000 but this was reduced to about 14,000 in the culling programme of the 1950s. Counts in the early 1970s returned about 11,000 but heavy poaching during the Amin years substantially reduced numbers and in 1989 a total population of 2,172 was estimated from an aerial sample count. Similar numbers were found in the Murchison Falls National Park in the past but there, too, heavy poaching has reduced the population to remnant numbers although a recent count has not been made. The latest appears to have been in 1980 when 1,202 were recorded on the Nile between the falls and Paraa Lodge. The total for the whole park is probably about the same as in Queen Elizabeth National Park i.e. a few thousand. Other regions in Uganda where substantial numbers of hippopotamus occurred include the Semliki River and lakes Victoria and Kyoga. An educated guess of about 7,000 for the present total population of hippopotamus in the whole country is probably not far wrong.' (Eltringham, 1993a). Decreasing.

Spinage (1959) referred to the overgrazing problems caused by the estimated 14,000 hippos in the Queen Elizabeth National Park and discussed the need for a culling programme. Petrides and Swank (1965) carried out regular censuses of grasslands near Lake Edward in the west and found densities of up to 38.5 hippos per square mile in some heavily overgrazed areas.

Population estimates for Uganda were as follows: 4,400 in 1995 from an aerial count; Queen Elizabeth NP: 2,800 in 1995; Murchison Falls NP: 1,500 in 1995 (Michelmore, F., *in litt.* to TRAFFIC East/Southern Africa, 1999).

Zambia: 'There are probably more hippopotamus in Zambia than in any other single country. F. E. C. Munyenymbe puts the country-wide total at 40,000 with 20,000-25,000 in the Luangwa Valley according to R. H. V. Bell. They are reported to be widespread on the Kafue Flats and in Lochinvar National Park.' (Eltringham, 1993a). Increasing.

Tembo (1987) summarised changes in numbers on the Luangwa River. In 1939 the population was reported to be critically low and the hippopotamus was afforded total protection; after that numbers rose steadily. By the late 1950s, concern was expressed that the large numbers were damaging the riparian ecosystem and 1,250 hippos were culled between 1965 and 1971. Hippos have been censused subsequently along a 165 km stretch of the Luangwa River in the South Luangwa National Park, with the following results:

Year	Number
1970	2,815
1972	2,919
1975	2,342
1976	4,501
1977	5,147
1978	4,765
1979	5,151
1981	4,884
1982	6,293
1983	6,544

The population growth for the study area during the period showed an annual increase of 7%, and the densities in 1983 were twice those recorded in Uganda in the 1950s when a management cull was initiated. Norton (1988) provided additional information on other areas of the Luangwa valley, with an estimate of over 14,000 hippopotamus in the 580 km stretch of the Luangwa River in 1981.

More recently, N. Ngoma (in IUCN Species Survival Commission and TRAFFIC Network, 1994) gave figures for a 1993 census of the same 165 km of the Luangwa river, which showed a marked decline of

more than 20% in the previous decade – from 6,832 in 1983 to 5,353 in 1993. However, in the Lower Zambezi area, the population had increased more than five-fold in 20 years, from 415 animals in 1972 to 2,416 in 1994.

The population estimate for Lupande GMA was 5,464 in 1997. In the Luangwa Valley, from 1986-1998 hippopotamus numbers fluctuated between 32 and 40 per km of river frontage; the population had reached its carrying capacity and from 1995 to 1998 (no hippopotamus were culled in 1997) an average of 372 hippopotamuses were culled and the meat distributed (Kalyocha, G. *in litt.*, to TRAFFIC East/Southern Africa, 1998).

Zimbabwe: '...the species is still common. It is found on most of the large rivers particularly the Limpopo, Zambezi and the Sabi/Lundi systems. It is also found in smaller rivers and dams where there is permanent water. Some wander over long distances providing isolated records. Child (1994) provides a 1994 estimate of 2,331 hippopotamus in 37 communal (CAMPFIRE) districts. The only estimate for the country-wide total is that made by R. B. Martin (in Eltringham, 1993) on the basis of some limited counts, which have revealed some dense populations e.g. 2,000 on a 50 km section of the Zambezi. His estimate of 6,900, of which 5,530 occur in national parks or reserves, 1,020 on communal lands and 350 elsewhere.' (Eltringham, 1993a). Stable.

HABITAT AND ECOLOGY

The hippopotamus is found in all types of permanent freshwater habitats, including ponds, rivers, lakes, waterholes with gently sloping banks surrounded by grazing areas (savanna with year-round waterways and ponds, forest-savanna mosaics, swampy areas within forests). Preferred areas are deep permanent water with adjacent reedbeds and grassland (Nowak, 1991). It avoids extremely dense swampy vegetation and fast-moving waterways with rocky outcrops. It is found at altitudes of 2,000 m or more, and along the coasts at the mouth of rivers. (Anon., 1994). Diet consists mostly of grass and other vegetation (Kingdon, 1979). The hippopotamus is an amphibious animal, which spends the day in water and emerges at night to feed. Open water is not essential and the animal can survive in muddy wallows; however, it must have access to permanent water to which it can return in the dry season. The water body must be large enough to accommodate a number of animals because the hippopotamus is highly gregarious when resting by day. After sunset animals leave their wallows and spend the night grazing on short grass swards up to several kilometres from water. (Eltringham, 1993a). Animals may occur alone or in groups of up to 150 individuals; usual group size is 10 to 15 (Laws, 1984). The social system is based on mating territoriality. Territorial males monopolise a length of the shoreline of the river or lake and attempt to keep estrous females within it (Eltringham, 1993a; Nowak, 1991). Births tend to peak during the wet season. Generally a single calf is born after a gestation period of 227 to 240 days (Nowak, 1991). The interval between births is about 2 years (Kingdon, 1979). Sexual maturity is reached in wild males at 6 to 13 years and in females at 7 to 15 years (Dittrich, 1976). Average longevity in a protected population is around 41 years (Grzimek, 1975).

THREATS TO SURVIVAL AND DOMESTIC TRADE

Eltringham (1993a) suggested that the most serious threat was loss of grazing habitat to cultivation, which had been noted in Burundi, Democratic Republic of the Congo, Guinea, Kenya, Mali, and Nigeria.

Hunting for meat was mentioned as a factor in Benin, Burkina Faso, Central African Republic, Democratic Republic of the Congo, Ethiopia, Gabon, Ghana, Guinea-Bissau, Niger, Nigeria, Sierra Leone, Somalia, Sudan, Tanzania, Uganda and Zambia, but was not considered to be a serious threat (Eltringham, 1993a). Hillaby (1962), prior to the decrease in numbers in Uganda due to poaching, discussed the economic benefits of sustainably culling hippos for their meat. However, when culling was in progress 3,000 tonnes of meat were available annually but, despite being lean and equivalent in quality to beef, it was considered inferior and sold very cheaply (Anon., 1994). Schouteden (1945) described the massacre of thousands of hippopotamuses for meat in Chari, Central African Republic, and in the Democratic Republic of the Congo. J. P. d'Huart (in IUCN Species Survival Commission and TRAFFIC Network, 1994) also notes that hippopotamus were mainly poached for meat in the Democratic Republic of the Congo and that there was no specific trade in hides. In 1991, large-scale controlled slaughtering operations were proposed at Kilombero in southern Tanzania but were not carried out (Anon., 1994).

Hunting for skins or for trophies was said to take place in **Burundi, Central African Republic, Democratic Republic of the Congo, Senegal, Sierra Leone, Somalia, Zambia and Zimbabwe**. The main trophy product was the tusks, used as ivory for carving purposes. Eltringham (1993a) noted that fears had been expressed that the trade in teeth might increase beyond control because of the restrictions on the trade in elephant ivory; however, he had found little evidence of this at that time.

Various hippopotamus products, including the fat, skin and gall bladder, have been used in traditional African medicine (Anon., 1994). By-products of hippopotamus are used in traditional medicine in **Guinea-Bissau** (F. Correia, Ministério do Desenvolvimento Rural e Agricultura, Guinea-Bissau, *in litt.*, to CITES Secretariat, July 1996).

The other type of threat noted by Eltringham (1993a) was conflict between the hippopotamus and people. Crop damage had been recorded in **Botswana, Gambia, Malawi, Niger, Sierra Leone and Somalia**. In **Gabon**, and probably other countries, it was illegally killed by fishermen because of attacks by the animals. In **Malawi** it has been officially culled without apparently adversely affecting populations; however, hippos were also being poached for meat and illegally killed by refugees for food and cash (S. Munthali and A. P. Dzimbiri in IUCN Species Survival Commission and TRAFFIC Network, 1994). Expansion of the human population was perceived as a threat in **Côte d'Ivoire** and disturbance from the timber and fishery industries was cited as a threat in **Equatorial Guinea**. In **Zimbabwe** it was considered to be at risk because of conflict with a large-scale irrigation scheme. There were fears that anthrax might be a problem in the Zambezi River system and this disease was believed to be responsible for the deaths of 700-1,000 animals in the **Democratic Republic of the Congo** in 1990/1991 (J. P. d'Huart in IUCN Species Survival Commission and TRAFFIC Network, 1994).

Botswana: The hippopotamus is not included in the Recommended Allowable Off-take quotas set by the Department of Wildlife and National Parks, and generally are not legally culled through community meat distribution schemes, resident or safari hunting and ecological cropping (Traill-Thompson, J., *in litt.*, to TRAFFIC East/Southern Africa, 1998).

Threats to Hippopotamus populations through trade-motivated unsustainable harvest are believed to be limited. However, taboos are limited, with only the BaYei and BaKungun ethnic peoples of Ngamiland District reported to refrain from the consumption of hippopotamus meat for cultural and religious reasons (Traill-Thompson, J., *in litt.*, to TRAFFIC East/Southern Africa 1998).

Malawi: Hippos are legally culled in the country, with a total of 1,809 culled during the period 1986-1997. No licensed hunting, ranching or farming of hippos takes place in Malawi. Illegal hunting of hippos for meat and trophies occurs and during the period 1986 to 1996 a total of 97 poachers were arrested with hippopotamus meat and/or trophies (Munthali, S., *in litt.*, to TRAFFIC East/Southern Africa 1998).

Mozambique: Hippopotamus meat has been documented as consumed within the Maputo province and in the Zambezi Delta and Beira town of Sofala province. It is likely that consumption occurs throughout the country where hippos occur with no reports of consumption taboos identified among ethnic groups. Trade in hippopotamus meat in the areas documented is open and it is frequently available from informal traders, although the quantities traded are limited, e.g. hippopotamus meat represented only 0.5% of all wild meat consumed in the Zambezi delta survey area during 1997 (IUCN - Mozambique, *in litt.*, to TRAFFIC East/Southern Africa 1998). Poaching for meat is reported widely to be the fundamental factor responsible for declines in most wildlife populations (Anderson, *et al.*, 1990; Agostini, 1993; IUCN - Mozambique, *in litt.*, to TRAFFIC East/Southern Africa 1998). Legal utilisation of hippos is primarily through hunting by residents (and through allocation of hippopotamus quotas), safari hunting, and problem animal control. During the period 1991-1997 a quota totalling 800 hippos was allocated for hunting in controlled hunting Areas/Coutadas (259) and in open areas (541). Hippos are also one of the main species culled for crop and property protection, especially in Sofala Province and the Zambezi delta, although national numbers are unknown. Ecological cropping of hippopotamus populations is rare, and last occurred in 1987 when 500 animals were culled for disease protection over a three-month period. Since this time no community meat distribution cropping of hippopotamus has been undertaken (IUCN - Mozambique, *in litt.*, to TRAFFIC East/Southern Africa 1998).

Zambia: Hippos are legally utilised through citizen, non-citizen and safari hunting which, for the year 1996, resulted in 84 animals hunted. Culling for community meat distribution takes place on a wide scale and, during 1997, a total of 750 hippos were allocated by NPWS for culling in Chiawa, Luangwa Valley, Upper Lupande, Lower Lupande, Munyamadzi and Musalangu West. In addition, problem animal control resulted in the culling of 233 hippos during the 1973-1993 period. In recent years taboos associated with the consumption of hippopotamus meat in the Luangwa Valley have gradually eroded. In line with a decrease in numbers of favoured species, such as buffalo, the valley people have, since 1995, increasingly targetted hippopotamus meat for commercial trade and subsistence use. Such changes have been reflected in an increase in the number of poachers arrested with hippopotamus meat over the past three years, and the increased demand from local inhabitants for hippopotamus meat supplied from legal cropping schemes undertaken in the valley. The use of hippos for meat is increasingly being recognised as a major factor influencing population status, although information on trophy motivated hunting is unavailable (Kalyocha, G., *in litt.*, to TRAFFIC East/Southern Africa 1998).

Zimbabwe: A representative sample of large-scale private land owners revealed, in 1997, that hippos are not culled or cropped for meat, trophy use or hunted by residents or foreign safari hunters. In Safari Areas (Controlled Hunting Blocks), however, hippos are believed to be hunted by safari hunters for sport. In Communal Areas, under the CAMPFIRE initiative authorised districts do receive an annual quota for the utilisation of hippos. In such districts hippos are sold for sport hunting, culled for meat distribution, and culled through problem animal control for protection of crops and property. Since 1994, such quotas have been developed at the district level but were unavailable. In 1994, however, a total population estimate of 2,331 hippos was estimated to occur in 37 CAMPFIRE Districts. Of this total population, 70 were allocated for utilisation by the Districts (Child, 1994).

INTERNATIONAL TRADE

Hippopotamus are utilised throughout much of their range as a source of meat, ivory (canine and incisor teeth) and skins (IUCN/SSC and The TRAFFIC Network, 1994). CITES Annual Report data record the trade in a variety of hippopotamus products: belts, bone carvings (piece and gramme), bodies, bones, carvings (by piece, kilogrammes or set), derivatives, ears, feet, garments, hair, handbags, horn carvings, horns, ivory carvings (by piece, gramme, kilogramme, or set), ivory pieces, leather products (large), leather products (small), other, pairs of shoes, skeletons, skins (by piece, kilogrammes, square feet or square metres), leather items, skin pieces (by kilogrammes, metres, square feet or square metres), skin scraps, skulls, specimens, tails, teeth (by number, gramme, kilogramme, pair, or set), trophies (by number or kilogrammes), tusks (by piece or kilogramme), unspecified, wallets or watchstraps.

These data provide a general picture of the international trade in hippopotamus products and highlight the main range States and consumer markets involved. However, the large number of different terms used to describe the trade and the variable reporting of trade by the Parties makes it difficult to compare reported export volumes with reported imports or to determine the number of animals involved in the trade. Where one Party may report the export of ivory carvings, for example, by number of carvings, the importing country may report the same shipment by kilogrammes. Comparative analysis of import and export data does provide an understanding of the overall trade dynamics and the role of key range States and consumer countries.

The majority of CITES-reported trade in hippopotamus products for the period 1991 – 1996 was in teeth and tusks. To facilitate data analysis, teeth and tusks were combined and records of trade in individual teeth/tusks were converted to kilogrammes using a conversion rate of 0.4 kg per tooth/tusk based on Weiler, *et al.*, (1994). It is not possible to determine how many hippopotamuses are represented by the number / quantity (kg) of teeth in trade. Trade recorded by sets was not examined as trade levels were insignificant.

Gross reported exports in teeth/tusks from range States increased overall from 1991 to 1996, peaking in 1994 at 25 tonnes (Table 1) and totalling 91.6 tonnes for the period of record. A dramatic increase in reported trade is apparent in 1994, when the Parties agreed to include *Hippopotamus amphibius* on CITES Appendix II although before the listing became effective (February 1995). The main range

States involved in the trade of teeth/tusks were, respectively, Tanzania, Democratic Republic of the Congo (formerly Zaire), and Zambia (Table 2).

Table 1 Gross reported exports in Hippopotamus teeth/tusks from range States, 1991 – 1996

Year	No. of Teeth / Tusk	Equiv in kg	Quantity (kg)	Total kg
1991	1,468	587.20	9,774	10,361.2
1992	2,781	1,112.40	4,193	5,305.4
1993	11,513	4,605.20	1,920	6,525.2
1994	3,948	1,579.20	24,070	25,649.2
1995	42,884	17,153.60	6,563	23,716.6
1996	28,987	11,594.80	8,420	20,014.8
Total	91,581	36,632.40	54,940	91,572.4

Table 2 Gross reported exports from the top three range States trading in teeth/tusks, 1991 – 1996

TZ	YEAR	No. of teeth / tusks	Equiv in kg	Quantity (kg)	Total (kg)
	1991	488	195.2	0	195.2
	1992	1434	573.6	3675	4248.6
	1993	10512	4204.8	0	4204.8
	1994	2583	1033.2	13259	14292.2
	1995	31251	12500.4	59	12559.4
	1996	27970	11188	0	11188
Total		74238	29695.2	16993	46688.2
ZR	YEAR	No. of teeth / tusks	Equiv in kg	Quantity (kg)	Total (kg)
	1991	0	0	0	0
	1992	0	0	0	0
	1993	0	0	0	0
	1994	2	0.8	10550	10550.8
	1995	0	0	5250	5250
	1996	0	0	7050	7050
Total		2	0.8	22850	22850.8
ZM	YEAR	No. of teeth / tusks	Equiv in kg	Quantity (kg)	Total (kg)
	1991	341	136.4	40	176.4
	1992	168	67.2	0	67.2
	1993	152	60.8	0	60.8
	1994	798	319.2	120	439.2
	1995	5669	2267.6	180	2447.6
	1996	556	222.4	0	222.4
Total		7684	3073.6	340	3413.6

Analysis of trade data for individual range States for 1995 and 1996 revealed that reported imports of teeth/tusks from Uganda and South Africa exceeded reported exports by these countries in 1995. Reported imports from Uganda, the Democratic Republic of the Congo and, to a lesser extent, South Africa and Zimbabwe exceeded reported exports by these countries in 1996. Importing countries record imports of just over 7 tonnes from the Democratic Republic of the Congo, 75% of which was imported by Belgium and thence re-exported to Hong Kong. Teeth/tusks of Ugandan origin also feature prominently in trade. Records of imports by other Parties record Hong Kong as the re-exporting country for most Hippopotamus ivory of Ugandan origin in 1995/96 (over 3 tonnes in 1996). Neither

the Democratic Republic of the Congo, Uganda nor Hong Kong had submitted annual reports for 1995 or 1996 at the time of analysis.

Uganda has, since 1991, only reported exports of one tooth (in 1993). Re-exports of teeth/tusks of Ugandan origin, however, total around 4,500 kg from 1991 – 1996, 73% of which trade took place in 1996. Uganda apparently has a stock of hippopotamus teeth dating back to the 1970s although the size of the stockpile has yet to be determined (TRAFFIC East / Southern Africa, *in litt.*, 20/04/96). Additional information is required about the size of the stockpile and the source of ivory in trade. In May 1997, a shipment of 1,738 hippopotamus teeth exported from Uganda and destined for Hong Kong was seized in France (Anon., 1997).

Hong Kong is evidently the major importer of Hippopotamus ivory, importing 88% of Tanzanian exports (>52 tonnes) in 1995/96. Table 3 illustrates gross imports recorded from Hong Kong, 1991 – 1996.

Table 3 Gross reported imports of teeth/tusks from Hong Kong, 1991 – 1996

Year	Trade reported by No. of teeth/tusk	Equivalent No. of teeth/tusk in kg	Trade reported by quantity (kg)	Trade reported by quantity (g)	Total kg
1991	3869	1547.6	0	0	1547.6
1992	2370	948	453	112	1401.1
1993	4719	1887.6	0	0	1887.6
1994	4683	1873.2	6	0	1879.2
1995	4602	1840.8	6903	0	8743.8
1996	2836	1134.4	16537	0	17671.4

A dramatic increase in reported imports from Hong Kong is evident in 1995, when the CITES Appendix II listing came into effect, with reported imports from Hong Kong doubling from 1995 to 1996. Belgium also plays an important role in the teeth/tusk trade, primarily, it would appear, as a transit point for exports to Hong Kong. Belgium reported the export to Hong Kong of over 13 tonnes in 1995/96. Other exports recorded by Belgium for the same period were for 1759 kg to China and two teeth to Japan.

China is the main destination for teeth/tusks re-exported from Hong Kong, presumably for the carving industry. After China, Belgium, the United States and Italy were, respectively, the countries reporting the most imports from Hong Kong (Table 4).

Table 4 Parties reporting imports from Hong Kong, 1995 / 1996

Importing country	Trade reported by No. of teeth/tusk	Equivalent No. of teeth/tusk in kg	Trade reported by quantity (kg)	Total kg
CN	200	80	21972	22052
BE	89	35.6	1453	1488.6
US	3273	1309.2	0	1309.2
IT	2093	837.2	0	837.2
FR	1210	484	0	484
DE	482	192.8	0	192.8
CH	53	21.2	0	21.2
NZ	40	16	0	16
GB	0	0	14	14
Total				26415

Ivory Carvings and Carvings

Reported trade in carvings was assumed to refer to ivory carvings (there is a separate category for bone carvings). Trade data in ivory carvings and carvings were therefore combined for this analysis and are collectively referred to below as "carvings". The top three range States exporting carvings were, respectively, Tanzania, South Africa, and Malawi, (Table 5).

Table 5 Gross reported exports of ivory carvings from main range States, 1991 - 1996

Year	1991	1992	1993	1994	1995	1996
TZ	100	12	227	169	2871	503
ZA	0	338	21	205	278	49
MW	14	0	197	19	0	52
ZW	20	2	3	20	111	32
MZ	0	39	0	0	0	0
GH	0	0	0	0	35	0
UG	5	21	1	0	0	0
BW	0	0	0	0	0	25

Note*: Malawi also exported 6 kg of carvings in 1991

Tanzania also exported 0.5kg of carvings in 1995 and 10kg in 1996

Exports of carvings from the range States are relatively small in quantity although there may be additional trade as "personal effects" for which permits are not required.

Imports of carvings in 1995/96 recorded from Tanzania (3368 and 10 kg), South Africa (307), and to a minor extent Ghana, and Botswana exceeded exports reported by those same countries (6 carvings reported by Tanzania and 5 carvings reported by South Africa). As only remnant populations exist in Ghana (Eltringham, 1993) even low export volumes from Ghana may be of concern. Minor quantities of figurines originating in the Democratic Republic of the Congo were also seized at Brussels International Airport from 1993 - 1996 (TRAFFIC Europe, *in litt.*, to TRAFFIC International, February 1999).

As with trade in teeth/tusks, Tanzania is the main range State reporting the export of ivory carvings. Hong Kong was the main importer and re-exporter of Tanzanian carvings. In 1995/96, Hong Kong re-exported 32,835 carvings and 1873.5 kg. Of these re-exports, 28,888 carvings (88%) and 1429 kg (76%) originated from Tanzania. Main countries of destination for Hong Kong re-exports are illustrated in Table 6.

Table 6 Main countries of import for ivory carvings from Hong Kong, 1995 - 1996

Country	No. IVC / CAR	Quantity (kg)	Quantity (g)
US	23627	0	4500
ES	6798	0	0
FR	1431	0	0
NL	563	0	0
DK	317	0	0
BE	0	839	0
CN	0	420	0
JP	0	412	0

Trade in skins

Gross reported exports of skins from the range States are presented in Table 7. Zambia and Zimbabwe were the main range States reporting trade in Hippopotamus skins for the period 1995 – 1996. Gross reported exports from Botswana (6903) appear to be wrong. Botswana's Annual Report for 1994 stated that 5713.75 Leather (of undetermined unit) were exported to Malawi (country of origin Malawi). However, the US reports the import of 1189 skins from Botswana in 1994 which, given the population status in Botswana (Eltringham, 1993a), is of concern. Botswana does not report this export.

Table 7 Gross exports from range States in Hippopotamus skins, 1991 – 1996

UNIT	CTRY	1991	1992	1993	1994	1995	1996
	BW	0	0	0	6903*	0	0
SQM	BW	0	0	507	0	0	0
	KE	0	0	2	0	0	0
	MW	253	0	133	373	0	0
KG	MW	7000	4000	0	0	0	0
	MZ	1	0	0	0	0	0
	TZ	1	0	2	598	3	62
	ZA	2	0	0	1	46	53
FEE	ZA	0	0	0	0	866	0
SQM	ZA	138	0	0	0	0	0
	ZM	2	0	0	8	2030	11
	ZW	0	1708	743	5	1792	196
FEE	ZW	0	0	0	0	0	800
KG	ZW	0	10	0	0	0	0
SQF	ZW	1489	1042	500	0	4600	1668
SQM	ZW	0	0	0	0	0	18

Note *: Gross reported exports from Botswana should not refer to skins, see text above.

Trade in Trophies

Gross reported exports by the range States (Table 8) show that Zimbabwe, Tanzania and Zambia, respectively, were the top three range States for trade in trophies.

Table 8 Gross reported exports of trophies from the range States, 1991 - 1996

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996
TRO		BW	0	0	1	3	0	0
TRO		CM	34	3	13	33	4	1
TRO		ET	0	0	3	0	0	0
TRO		KE	0	0	0	0	0	2
TRO		MZ	0	0	0	0	0	5
TRO		NA	0	0	0	1	4	0
TRO		TZ	301	219	138	89	75	138
TRO		ZA	21	12	47	36	28	21
TRO		ZM	152	256	142	36	72	124
TRO		ZW	33	516	167	59	142	195
TRO	KG	ZA	268	0	0	0	0	0
TRO	KG	ZW	0	0	0	0	2	0

Analysis of 1995/96 export and import data show that, with the exception of Mozambique and Namibia, reported imports of trophies exceeded reported exports for all range states Table (9). Imports recorded from Zimbabwe, South Africa and Zambia exceed reported exports by 8 times, 5 times and three times, respectively. Norway reports an import of one trophy from Spain in 1995 as originating from Kenya although Kenya reports no exports. Serious difficulties arise, however, when drawing

conclusions from these data: while the country of origin may report a single trophy export this export may consist of several teeth/tusks, etc., and may be reported as such by the importing country.

Table 9 Reported exports and imports of trophies from range States, 1995/96

Country	Exports reported by:	Imports reported from:
CM	0	5
MZ	5	0
NA	4	0
TZ	96	187
ZA	9	44
ZM	53	173
ZW	44	331*

Note*: Imports from Zimbabwe also record 2kg of trophies.

Gross exports of *Hippopotamus amphibius*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996 total	average	
BEL		US	2	0	0	0	0	2	0.3	
BOC		CN	0	0	0	0	23	23	3.8	
BOC		DE	0	0	0	0	0	1	0.2	
BOC		HK	45	0	0	0	0	45	7.5	
BOC		IT	0	0	0	0	2	2	0.3	
BOC		TZ	0	0	37	0	2987	340	3364	560.7
BOC		ZA	0	0	22	36	2	0	60	10.0
BOC		ZW	0	0	0	1	1	6	8	1.3
BOC	G	HK	4500	0	0	0	0	0	4500	750.0
BOD		US	0	0	3	0	0	0	3	0.5
BOD		ZA	0	13	0	0	1	0	14	2.3
BOD		ZW	1	0	0	0	0	0	1	0.2
BON		CI	0	0	0	0	1	0	1	0.2
BON		ET	0	0	1	0	0	0	1	0.2
BON		ZW	0	0	1	0	8	0	9	1.5
CAR		AT	0	1	0	0	0	0	1	0.2
CAR		BR	0	1	0	0	0	0	1	0.2
CAR		CM	15	2	0	0	0	0	17	2.8
CAR		CN	0	0	0	0	426	0	426	71.0
CAR		FR	0	0	2	0	0	0	2	0.3
CAR		GB	0	0	0	3	9	5	17	2.8
CAR		HK	1047	3891	6299	4766	4039	5127	25169	4194.8
CAR		JP	1	1	0	0	0	0	2	0.3
CAR		KE	0	0	0	0	1	0	1	0.2
CAR		MW	14	0	197	19	0	42	272	45.3
CAR		MZ	0	39	0	0	0	0	39	6.5
CAR		PK	0	0	0	1	0	0	1	0.2
CAR		TZ	0	12	185	0	611	0	808	134.7
CAR		UG	5	21	1	0	0	0	27	4.5
CAR		US	0	0	0	1	12	0	13	2.2
CAR		ZA	0	0	0	7	0	8	15	2.5
CAR		ZW	3	2	3	8	20	6	42	7.0
CAR	KG	CN	0	0	0	0	0	17	17	2.8
CAR	KG	HK	0	32	0	144	413	0	589	98.2
CAR	KG	ID	0	0	0	0	2	0	2	0.3
CAR	KG	MW	6	0	0	0	0	0	6	1.0
CAR	SET	CN	0	0	0	0	2	0	2	0.3
CAR	SET	TZ	0	2	0	0	0	0	2	0.3
CAR	SET	UG	0	0	1	0	0	0	1	0.2

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996 total	average	
DER		HK	0	0	0	0	0	60	60	10.0
EAR		ZM	0	0	0	0	0	2	2	0.3
FOO		CA	0	0	0	0	2	0	2	0.3
FOO		CM	12	4	0	0	0	0	16	2.7
FOO		DE	0	0	1	1	0	0	2	0.3
FOO		MZ	10	0	0	0	0	0	10	1.7
FOO		NA	0	0	0	2	0	0	2	0.3
FOO		TZ	7	25	0	4	2	4	42	7.0
FOO		ZA	0	0	0	0	0	4	4	0.7
FOO		ZM	0	6	0	0	1	0	7	1.2
FOO		ZW	6	70	58	4	139	0	277	46.2
GAR		TZ	0	0	0	0	1	0	1	0.2
HAI		ZW	0	0	0	0	1	0	1	0.2
HAN		DE	3	0	0	0	6	0	9	1.5
HAN		IT	11	6	2	0	83	88	190	31.7
HAN		NA	0	0	0	0	2	0	2	0.3
HOC		HK	0	400	0	0	0	0	400	66.7
HOR		ZW	0	0	0	0	1	0	1	0.2
IVC		AR	0	0	0	2	0	0	2	0.3
IVC		BR	0	1	0	0	0	0	1	0.2
IVC		BW	0	0	0	0	0	25	25	4.2
IVC		CA	0	18	0	0	0	0	18	3.0
IVC		CN	0	0	0	0	0	1288	1288	214.7
IVC		FR	0	0	2	0	0	0	2	0.3
IVC		GB	0	0	0	1	0	0	1	0.2
IVC		GH	0	0	0	0	35	0	35	5.8
IVC		HK	5171	7339	11576	6109	8764	14905	53864	8977.3
IVC		JP	0	2	0	4	0	0	6	1.0
IVC		MW	0	0	0	0	0	10	10	1.7
IVC		NG	0	1	0	0	0	0	1	0.2
IVC		TZ	100	0	42	169	2260	503	3074	512.3
IVC		US	1	1	4	4	0	61	71	11.8
IVC		XX	226	2	0	0	0	0	228	38.0
IVC		ZA	0	338	21	198	278	41	876	146.0
IVC		ZW	17	0	0	12	91	26	146	24.3
IVC	G	DE	0	70	0	0	0	0	70	11.7
IVC	G	HK	7000	600	13880	24100	4500	0	50080	8346.7
IVC	G	TZ	0	0	0	0	500	0	500	83.3
IVC	KG	CN	0	0	0	0	3600	16429	20029	3338.2
IVC	KG	HK	34	0	48	40	870	588	1580	263.3
IVC	KG	TZ	0	0	0	0	0	10	10	1.7
IVC	SET	ZM	0	0	0	0	1	0	1	0.2
IVP		ZA	0	0	0	0	0	8	8	1.3
LIV		AT	0	0	1	0	0	0	1	0.2
LIV		AU	0	1	0	0	0	0	1	0.2
LIV		BR	0	0	1	0	0	0	1	0.2
LIV		CA	0	0	0	0	1	0	1	0.2
LIV		CH	0	0	2	0	0	0	2	0.3
LIV		CS	1	0	0	0	0	0	1	0.2
LIV		CZ	0	0	1	1	2	1	5	0.8
LIV		DE	0	3	0	0	0	1	4	0.7
LIV		DK	1	0	0	0	0	2	3	0.5
LIV		DO	0	0	1	0	0	0	1	0.2
LIV		ES	0	0	0	0	0	2	2	0.3
LIV		FR	0	0	0	0	1	0	1	0.2
LIV		GB	0	0	2	0	0	1	3	0.5
LIV		HU	1	1	1	0	0	0	3	0.5
LIV		IE	1	0	1	1	0	1	4	0.7

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996 total	average	
LIV		IT	0	0	1	0	0	0	1	0.2
LIV		JP	0	0	0	0	2	0	2	0.3
LIV		MX	0	0	0	0	2	0	2	0.3
LIV		MY	0	0	0	2	0	0	2	0.3
LIV		NL	0	1	2	0	0	0	3	0.5
LIV		PL	4	0	0	1	1	3	9	1.5
LIV		PT	0	0	1	1	0	0	2	0.3
LIV		RU	0	0	0	0	2	3	5	0.8
LIV		SG	0	0	2	0	1	0	3	0.5
LIV		TH	0	0	0	1	0	0	1	0.2
LIV		US	0	0	0	1	0	0	1	0.2
LIV		ZW	0	0	0	2	0	0	2	0.3
LPL		IT	0	0	0	0	8	0	8	1.3
LPL		KR	0	0	0	92	0	0	92	15.3
LPL		ZW	0	0	0	0	28	0	28	4.7
LPS		IT	0	0	0	0	45	0	45	7.5
LPS		KR	0	0	0	92	0	0	92	15.3
LPS		US	0	0	0	16	6	0	22	3.7
LPS		ZW	0	0	0	0	7	0	7	1.2
OTH		ZW	0	0	0	0	16	0	16	2.7
SHO		CA	0	0	0	0	0	0	0	0.0
SHO		IT	0	0	0	0	0	8	8	1.3
SHO		MX	20	0	0	0	0	0	20	3.3
SHO		US	65	98	26	17	9	7	222	37.0
SKE		KE	0	0	2	1	0	0	3	0.5
SKI		BW	0	0	0	6903	0	0	6903	1150.5
SKI		CA	0	0	0	0	1	0	1	0.2
SKI		DE	0	0	1	0	0	0	1	0.2
SKI		GB	6	1970	0	1684	0	824	4484	747.3
SKI		KE	0	0	2	0	0	0	2	0.3
SKI		MW	253	0	133	373	0	0	759	126.5
SKI		MZ	1	0	0	0	0	0	1	0.2
SKI		TZ	1	0	2	598	3	62	666	111.0
SKI		US	0	0	7	0	0	0	7	1.2
SKI		ZA	2	0	0	1	46	53	102	17.0
SKI		ZM	2	0	0	8	2030	11	2051	341.8
SKI		ZW	0	1708	743	5	1792	196	4444	740.7
SKI	FEE	ZA	0	0	0	0	866	0	866	144.3
SKI	FEE	ZW	0	0	0	0	0	800	800	133.3
SKI	KG	GB	0	322	0	0	0	0	322	53.7
SKI	KG	MW	7000	4000	0	0	0	0	11000	1833.3
SKI	KG	ZW	0	10	0	0	0	0	10	1.7
SKI	SQF	GB	1674	0	0	0	0	0	1674	279.0
SKI	SQF	ZW	1489	1042	500	0	4600	1668	9299	1549.8
SKI	SQM	BW	0	0	507	0	0	0	507	84.5
SKI	SQM	GB	105	0	0	0	0	0	105	17.5
SKI	SQM	US	0	531	0	0	0	0	531	88.5
SKI	SQM	ZA	138	0	0	0	0	0	138	23.0
SKI	SQM	ZW	0	0	0	0	0	18	18	3.0
SKO		CA	0	0	0	0	0	0	0	0.0
SKO		GB	0	0	0	0	1	0	1	0.2
SKO		KE	1	0	0	8	0	0	9	1.5
SKO		TZ	6	0	1	0	0	10	17	2.8
SKO		US	2	0	3	0	10	0	15	2.5
SKO		ZA	0	95	23	18	5	1	142	23.7
SKO		ZW	3	0	0	0	3	1	7	1.2
SKP		BW	0	0	361	0	0	0	361	60.2
SKP		DE	0	0	0	0	12	0	12	2.0

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996 total	average
SKP		GB	8	0	0	0	0	0	8
SKP		TZ	5	4	1	4	6	0	20
SKP		US	144	2	0	0	0	0	146
SKP		ZA	197	266	80	23	2	1	569
SKP		ZM	0	0	0	203	2000	5	2208
SKP		ZW	4	2006	315	6	72	3	2406
SKP	KG	GB	72	112	0	0	0	0	184
SKP	KG	ZW	80	0	0	0	0	0	80
SKP	MTR	GB	85	0	0	0	0	0	85
SKP	SQF	ZW	0	0	0	0	3703	0	3703
SKP	SQM	GB	125	118	0	0	0	0	243
SKP	SQM	ZW	0	0	0	93	0	0	93
SKS		ZW	0	1	0	0	0	0	1
SKU		BW	0	5	0	0	0	0	5
SKU		CA	0	0	0	0	1	0	1
SKU		CM	0	1	0	2	0	0	3
SKU		DE	0	1	2	0	0	0	3
SKU		GB	0	0	0	1	0	0	1
SKU		MZ	1	0	0	0	0	0	1
SKU		RW	1	0	0	0	0	0	1
SKU		TZ	5	1	2	7	5	5	25
SKU		US	0	0	0	1	1	0	2
SKU		ZA	34	12	2	2	4	1	55
SKU		ZM	0	1	0	2	14	4	21
SKU		ZW	3	27	12	4	60	5	111
SPE		JP	0	6	0	0	0	0	6
SPE		US	0	0	1	0	0	0	1
TAI		CA	0	0	0	0	1	0	1
TAI		CM	1	0	0	0	0	0	1
TAI		TZ	0	0	0	0	1	0	1
TAI		ZA	0	0	0	0	1	0	1
TAI		ZM	0	0	0	0	0	2	2
TAI		ZW	0	3	4	1	6	0	14
TEE		AE	0	2110	0	0	0	0	2110
TEE		BE	0	4933	9539	0	2	0	14474
TEE		CA	0	1	0	0	0	0	1
TEE		CG	0	2	0	2	0	0	4
TEE		CH	0	0	0	0	1	4	5
TEE		CI	4	0	0	0	0	0	4
TEE		CM	102	89	0	48	13	2	254
TEE		CN	0	0	0	0	0	40	40
TEE		DE	12	7	4	0	36	0	59
TEE		DK	0	10	0	2	0	0	12
TEE		ES	0	0	0	0	0	12	12
TEE		ET	0	0	2	0	0	0	2
TEE		FR	0	15	0	12	11	0	38
TEE		GL	1	0	0	0	0	0	1
TEE		GN	0	0	0	3	0	0	3
TEE		HK	3869	2370	4719	4683	4602	2836	23079
TEE		JP	0	2	0	0	0	0	2
TEE		KE	0	1	0	0	0	0	1
TEE		ML	0	0	0	2	0	0	2
TEE		MW	276	172	62	36	20	90	656
TEE		MY	0	0	0	0	1	0	1
TEE		MZ	36	0	4	0	0	0	40
TEE		NA	0	0	0	18	4	0	22
TEE		NL	0	0	4	0	0	0	4
TEE		PT	0	0	0	1	0	0	1

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996 total	average
TEE		TD	1	0	0	0	0	0	1 0.2
TEE		TZ	488	1434	10512	2571	31239	27970 74214	12369.0
TEE		UG	0	0	1	0	0	0	1 0.2
TEE		US	5	7	0	0	0	0	12 2.0
TEE		XX	0	0	1	0	0	0	1 0.2
TEE		ZA	114	137	104	134	250	46 785	130.8
TEE		ZM	326	150	145	798	5669	556 7644	1274.0
TEE		ZR	0	0	0	2	0	0	2 0.3
TEE		ZW	104	738	641	319	5304	222 7328	1221.3
TEE	G	HK	0	112	0	0	0	0	112 18.7
TEE	KG	BE	0	0	0	0	4414	10460 14874	2479.0
TEE	KG	BI	7511	0	0	0	0	0	7511 1251.8
TEE	KG	BW	200	0	0	3	0	0	203 33.8
TEE	KG	GB	0	0	0	4	0	0	4 0.7
TEE	KG	HK	0	453	0	6	6903	16537 23899	3983.2
TEE	KG	KE	0	0	0	18	0	0	18 3.0
TEE	KG	MW	1981	301	1920	106	1074	1365 6747	1124.5
TEE	KG	TZ	0	3675	0	13259	59	0	16993 2832.2
TEE	KG	US	0	0	0	0	2	0	2 0.3
TEE	KG	XX	0	0	0	23	0	0	23 3.8
TEE	KG	ZA	22	210	0	0	0	5	237 39.5
TEE	KG	ZM	40	0	0	120	180	0	340 56.7
TEE	KG	ZR	0	0	0	10550	5250	7050	22850 3808.3
TEE	KG	ZW	20	0	0	0	0	0	20 3.3
TEE	PAI	US	0	1	0	0	0	0	1 0.2
TEE	SET	ZW	0	0	0	1	0	0	1 0.2
TRO		BW	0	0	1	3	0	0	4 0.7
TRO		CM	34	3	13	33	4	1	88 14.7
TRO		DK	0	2	0	0	0	0	2 0.3
TRO		ES	0	0	0	0	1	0	1 0.2
TRO		ET	0	0	3	0	0	0	3 0.5
TRO		FR	0	1	2	0	0	0	3 0.5
TRO		KE	0	0	0	0	0	2	2 0.3
TRO		MX	0	0	0	0	1	0	1 0.2
TRO		MZ	0	0	0	0	0	5	5 0.8
TRO		NA	0	0	0	1	4	0	5 0.8
TRO		TZ	301	219	138	89	75	138	960 160.0
TRO		US	1	1	5	12	2	0	21 3.5
TRO		XX	0	0	0	0	1	0	1 0.2
TRO		ZA	21	12	47	36	28	21	165 27.5
TRO		ZM	152	256	142	36	72	124	782 130.3
TRO		ZW	33	516	167	59	142	195	1112 185.3
TRO	KG	ZA	268	0	0	0	0	0	268 44.7
TRO	KG	ZW	0	0	0	0	2	0	2 0.3
TUS		AT	0	12	0	0	0	0	12 2.0
TUS		DE	10	12	12	0	0	0	34 5.7
TUS		ET	0	0	1	0	0	0	1 0.2
TUS		HK	0	0	0	0	0	2	2 0.3
TUS		JP	0	0	0	0	8	0	8 1.3
TUS		NG	0	1	0	0	0	0	1 0.2
TUS		TZ	0	0	0	12	12	0	24 4.0
TUS		US	0	0	5	12	0	0	17 2.8
TUS		ZA	2	3	13	2	6	22	48 8.0
TUS		ZM	15	18	7	0	0	0	40 6.7
TUS		ZW	0	36	21	4	367	79	507 84.5
TUS	KG	BW	0	0	0	14	0	0	14 2.3
TUS	KG	JP	80	0	0	0	0	0	80 13.3
TUS	KG	ZA	0	7	0	0	0	0	7 1.2

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996 total	average	
UNS		FR	0	0	0	0	2	0	2	0.3
UNS		GB	0	0	0	2	1	6	9	1.5
UNS		HK	125	0	0	370	0	0	495	82.5
UNS		IT	0	0	0	0	8	44	52	8.7
UNS		KE	0	0	0	0	1	0	1	0.2
UNS		MW	0	0	1	0	0	0	1	0.2
UNS		TZ	0	0	0	3	0	0	3	0.5
UNS		ZA	0	0	14	0	0	2	16	2.7
UNS		ZW	0	0	0	0	0	2	2	0.3
WAL		IT	0	0	0	0	35	2	37	6.2
WAL		TZ	0	0	0	0	2	0	2	0.3
WAT		TZ	0	0	0	0	0	6	6	1.0

CONSERVATION MEASURES

Taken mainly from Eltringham (1993a).

Angola: Fully protected.

Benin: *No information*

Botswana: Fully protected.

Burkina Faso: Partially protected.

Burundi: Fully protected.

Cameroon: Fully protected.

Central African Republic: Fully protected.

Chad: Fully protected (Director, Forests and Protection of the Environment, Chad, *in litt.*, to CITES Secretariat, July 1996).

Congo: Fully protected.

Democratic Republic of the Congo: Legislation enacted when the country was known as ZAIRE remains in effect. Relevant legislation includes the *Loi Portant Réglementation de la Chasse, 28 Mai 1982* (Hunting Act), which provides for the establishment of game reserves, open and closed seasons, regulates hunting methods, lists protected and partially protected species, establishes conditions for issuance, validity and use of hunting licenses, and prohibits the export of protected and partially protected species without a certificate of lawful possession. *Hippopotamus amphibius* is listed as a partially protected species. A permit is required to hunt this species. Teeth of hippos found dead or hippos killed in self defense are the property of the state. Export of this species requires that the exporter have a certificate of lawful possession, which one can only get upon presentation of a certificate of origin of hunting (presumably this is a hunting permit) (IUCN, 1986; TRAFFIC East/Southern Africa, *in litt.*, to TRAFFIC International, March 1999).

Côte d'Ivoire: Partially protected.

Equatorial Guinea: Fully protected.

Eritrea: *No information*

Ethiopia: Fully protected.

Gabon: Fully protected.

Gambia: Fully protected.

Ghana: Fully protected (E. L. Lamptey *in litt.* to IUCN/SSC Wildlife Trade Programme, 1999).

Guinea: Fully protected.

Guinea-Bissau: Hunting of one animal a year is allowed with a professional permit. All areas where hippopotamus occur are being made into National Parks as a protection measure (F. Correia, Ministério do Desenvolvimento Rural e Agricultura, Guinea-Bissau, *in litt.*, to CITES Secretariat, July 1996).

Kenya: Legal Notice No. 120 of 1977, *The Wildlife (Conservation and Management) (Prohibition on Hunting of Game Animals) Regulations, 1977*, prohibits the hunting of all Game Animals.

Hippopotamus amphibius is listed as a Game Animal in the First Schedule of *The Wildlife (Conservation and Management) Act, 1985*, as amended. Therefore it is prohibited to hunt this animal (TRAFFIC East/Southern Africa, *in litt.*, to TRAFFIC East/Southern Africa, March 1999).

Liberia: Export of specimens and trophies prohibited since 10 April 1985.

Malawi: According to the *National Parks and Wildlife Act, 1992*, protected species of animals are classified as game species. A license issued by the Chief Parks and Wildlife Officer or other designated individual is required to hunt any protected species. *Hippopotamus amphibius* is listed as protected species in the *National Parks and Wildlife (Protected Species) Order, 1994*. Persons who

have lawfully acquired (under licence) a specimen of a protected species, must apply for a *Certificate of Ownership*. One must be in possession of a certificate of ownership to legally transfer through gift, sale or otherwise any specimen of a protected species. Import, export or re-export of any protected species requires a license issued by the Chief Parks and Wildlife Officer (TRAFFIC East/Southern Africa, *in litt.*, to TRAFFIC International, March 1999).

Mali: No information

Mauritania: No information

Mozambique: The *Decreto: Regulamenta das Modalidades de Caça a Serem Praticadas na República Popular de Moçambique, 1978* (Decree Regulating Hunting) regulates hunting and only authorises hunting for subsistence or for sport. This decree stipulates that a permit is required for hunting. The decree also establishes a closed season from 1 October to 31 March. Hunting is prohibited in conservation areas and hunting of protected species is prohibited (listed in the Hunting Regulations). The *Modalidades de Caça, 1978* (Hunting Regulations) lists *Hippopotamus amphibius* as a partially protected species for which hunting is allowed with a permit. Hunting of females with young is prohibited. A certificate of ownership is required for trophies. Hippotamus ivory must be declared within 30 days of killing the animal. Trade in trophies is prohibited without a certificate of ownership. Export of trophies must be accompanied by authorization from the competent authority (IUCN, 1986; TRAFFIC East/Southern Africa, *in litt.*, to TRAFFIC International, March 1999).

Namibia: Fully protected.

Niger: Fully protected.

Nigeria: Partially protected. No exports of wildlife for commercial purposes (CITES Notification No. 874).

Rwanda: No information

Senegal: Fully protected.

Sierra Leone: Fully protected.

Somalia: No information

South Africa: Cape Province. The Nature and Environmental Conservation Ordinance 19 of 1974 (covering: Eastern-, Western- and Northern Cape province) classifies *Hippopotamus amphibius* as a Protected Wild Animal.

- No person shall hunt any protected wild animals without a permit or a licence during the hunting season or without a permit during any other time. These provisions do not apply to any owner of land, any relative of such owner or any full-time employee of such owner acting on the authority of such owner, nor to anyone with the written permission of the owner, in respect of any protected wild animal found on the land of such owner.
- Prohibits hunting, keeping in captivity, laying poison, the donation or sale and possession of the wild animal or carcass thereof, the import into, export from or transport in or through the Province any wild animal, the sale and purchase of biltong, without a permit.
- A person authorised to keep hippopotamus in captivity requires a Certificate of Adequate Enclosure.

Transvaal. The Nature Conservation Ordinance 12 of 1983 (covering: Gauteng province, North West- and Northern Province) classifies *Hippopotamus amphibius* as Protected Game:

- No person shall hunt any protected wild animals without a permit or a licence during the hunting season or without a permit during any other time. These provisions do not apply to any owner of land, any relative of such owner or any full-time employee of such owner acting on the authority of such owner, nor to anyone with the written permission of the owner, in respect of any protected wild animal found on the land of such owner.
- Prohibits hunting, keeping in captivity, laying poison, the donation or sale and possession of the wild animal or carcass thereof, the picking up or removal of dead game, the import into, export from or transport in or through the Province any wild animal, the sale and purchase of biltong, without a permit.

Free State. The Nature Conservation Ordinance 8 of 1969 classifies *Hippopotamus amphibius* as Protected Game:

- No person shall hunt any protected wild animals without a permit or a licence during the hunting season or without a permit during any other time. These provisions do not apply to any owner of land, any relative of such owner or any full-time employee of such owner acting on the authority of such owner, nor to anyone with the written permission of the owner, in respect of any protected wild animal found on the land of such owner.
- Prohibits hunting, keeping in captivity, laying poison, the donation or sale and possession of the wild animal or carcass thereof, the import into, export from or transport in or through the Province

any wild animal, the sale and purchase of biltong, without a permit (TRAFFIC East/Southern Africa, *in litt.*, to TRAFFIC International, March 1999).

Sudan: Fully protected.

Swaziland: No information

Tanzania: Under the *Wildlife Conservation Act, 1974*, the capture of live animals requires a valid *Trapper's Card* and a *Permit to Capture Animals* (fees vary depending on the animal). There are also specific requirements for holding grounds. Container standards exist for the export of hippos. The hunting of any animal requires a valid *Game License*. Suitable weapons are also prescribed for different animals. All trophies must be registered with a *Certificate of Registration* and every trophy dealer must carry a valid *Trophy Dealer's License* (class 1 if whole or class 4 if polished, carved, manufactured or commercially processed). Exports of trophies must be accompanied by a *Trophy Export Certificate*. Hippos are listed as Big Game in the Third Schedule and as Dangerous Animals in the Fourth Schedule (TRAFFIC East/Southern Africa, *in litt.*, to TRAFFIC International, March 1999).

Togo: Fully protected.

Uganda: Fully protected.

Zambia: The National Parks and Wildlife Act (1991) remains the basis for wildlife management and utilisation. The commencement order for the Zambia Wildlife Act, passed by Parliament in 1998, has been postponed to 1 January, 2000 at which time the Zambia Wildlife Authority will come into being. Statutory Instrument No. 45 of 1998 on Protected Animals lists the Hippo as a protected animal (Chundama, M., WWF Zambia, *in litt.*, to TRAFFIC East/Southern Africa, March 1999).

Zimbabwe: The *Parks and Wild Life (General) Regulations, 1990*, establishes regulations for types of weapons that can be used for hunting and for *Hippopotamus amphibius* it is specified that any person who hunts this species shall use "a weapon having a rifled barrel and propelling a projectile of not less than nine comma two millimetres in diameter with not less than five comma three kilojoules of energy at the muzzle". A permit is required for hunting within the Parks and Wild Life Estate (national parks, botanical gardens, botanical reserves, sanctuaries, safari areas and recreational parks). It is prohibited for anyone to process, carve, embellish or otherwise manufacture any trophy for sale or reward without a *Trophy Dealer's License*. No person shall buy, sell, import or export any trophy without a *Trophy Dealer's License* (TRAFFIC East/Southern Africa, *in litt.*, to TRAFFIC International, March 1999).

CAPTIVE-BREEDING

According to Eltringham (1993a) the hippopotamus does well in captivity and breeds readily. Of the 99 specimens recorded by the International Species Inventory System (ISIS) in an incomplete census of zoos in 1985, 68% had been born in captivity. The breeding groups were small, however, as most zoos keep only a pair. Reproductive rates have been low with only eight young born within the previous 12 months in the above sample and, of these, three died within a month of birth.

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Manis crassicaudata Gray, 1827

Indian Pangolin
Pangolin indio
Grand pangolin de l'Inde

Order: PHOLIDOTA

Family: MANIDAE

SUMMARY

One of three Asiatic pangolin species, almost certainly confined to the Indian sub-continent and Sri Lanka although conceivably extending also into Myanmar and extreme western China. Evidently still widespread, although apparently nowhere common. Known to be used locally in many parts of its range for food and medicinal purposes. No evidence of international trade was identified during this review, and no international trade in the species has been recorded by CITES in the period 1984-1996, nor has any trade in pangolins been reported in that period by definite range States of the species.

The species is recommended under Decision 10.79 for inclusion in category d (iii).

DISTRIBUTION AND POPULATION

Occurs in the Indian sub-continent from eastern Pakistan, through much of India south of the Himalaya, Bangladesh and Sri Lanka, possibly also in Myanmar (Burma) and extreme western China, although this is thought unlikely (see below).

Virtually no information is available on population levels of this or any of the other Asian pangolins (see accounts for *Manis pentadactyla* and *M. javanica*). Being highly secretive, solitary and nocturnal they are rarely observed, and certainly not regularly enough to allow assessment of population densities. The species is classified as 'lower risk (near threatened)' by IUCN (1996).

Bangladesh Khan (1985) stated that the species was widely distributed over the country excluding the coastal parts of Khulna, Barisal, Pauakhali, Noakhali and Chittagong Districts, occurring in small numbers in sal, evergreen and semi-evergreen forests; it had possibly disappeared from Kushtia, Jessore, Pabna, Bogra, Rangpur, Dinajpur, Rajshahi and most parts of Dhaka and Comilla. Described in 1986 as rare (Bangladesh CITES MA, *in litt.* to IUCN Conservation Monitoring Centre, 1986).

India Tikader (1983) reported it as widely distributed through the plains and lower slopes of hills south of the Himalaya to the southern extremity of India. He considered that the population had been greatly reduced by hunting, although noted its overall status as indeterminate. Recent records include Kerala and Kanyakumari, Tamil Nadu (Mohan *in litt.* to TRAFFIC India, 1999), Delhi (Singh, 1994), Gwalior and Achanakur Wildlife Sanctuary (Madhya Pradesh) (Saxena 1985), Bandipur, Bhadra, Dalma and Dandeli Wildlife Sanctuaries and Bandipur Tiger Reserve (Karnataka), Buxa Tiger Reserve (West Bengal), Catugao Wildlife Sanctuary (Goa), Chambal National Park (Madhya Pradesh), Gir National Park (Gujarat), Keolodeo Ghana Wildlife Sanctuary (Rajasthan), Kotgarh and Kuldiha Wildlife Sanctuaries and the Sunabedh Plateau (Orissa), Singalila Wildlife Sanctuary (West Bengal), Achanakuar Wildlife Sanctuary (Madhya Pradesh) (Mitra, S., *in litt.*, to TRAFFIC India, March 1999) from Himalayan foothills, Uttar Pradesh, (TRAFFIC India *in litt.*, to TRAFFIC – International, 1999).

Pakistan The species is apparently very locally distributed and relatively uncommon in Pakistan (Roberts, 1977). It has been recorded in Sialkot, Jhelum and Gujrat Districts in the north-west of the Punjab, extending across the Salt Range into Kohat District, and from Campbellpur District up to Mardan and Peshawar in the North West Frontier Province; it was found in the Potwar Range and extended up to 750m elevation in the Rawalpindi foothills. Further south it appeared to be absent from the Indus riverine plain but did occur on the right bank of the Indus in the hilly regions in the western part of the Dadu and Larkana deserts (Baluchistan) and extended southward through Las Bela and Mekran; it also occurred east of the Indus in Hyderabad district and Tharparkar, extending eastwards to Kutch (Roberts, 1977). Described in 1986 as rare (Pakistan CITES MA *in litt.* to IUCN Conservation Monitoring Centre, 1986).

Sri Lanka Reported by Phillips (1981) as locally distributed throughout the whole of the lowlands, ascending to around 3500 feet (1100m) in hill regions. Its range appeared to coincide with that of the termites on which it fed. It was reportedly of variable abundance, but nowhere common.

[China Allen (1938) stated that the range of this species extended into extreme western Yunnan, but see the discussion under Myanmar below. Zhang (1997) included the species in a list of mammals in China, but cited Allen (1938) as the source.]

[Myanmar (Burma) Allen (1938) quotes nineteenth century sources which record it as occurring in low country around Bhamo and outlying spurs of the Kakhyen Mountains in north-east Myanmar and the adjacent part of China (see above); this appears to be considerably to the east of other records of this species and it is not mentioned as occurring in Myanmar by Salter (1983) or U Tun Yin (1967). It seems likely these records in fact refer to *Manis javanica*.]

HABITAT AND ECOLOGY

The species is little known. Like all pangolins it is a specialist feeder on termites and ants (Prater, 1965; Roberts, 1977; Tikader, 1981). In India said to occur in forests, open land and grassland, and to have been recorded near villages (Zoological Survey of India, 1994). Roberts (1977) notes that it is generally solitary and nocturnal, although cites an instance of a male and female found together in one burrow, and also mentions one report of an individual seen abroad during the day. The species is said to excavate its own burrows (which may reportedly reach a depth of 2 m in stony soil and 6 m in soft soil), often under a large rock. The entrance to the burrow is often sealed up with loose earth, making detection difficult (Roberts, 1977). Females usually give birth to one young, although twins are apparently not unknown; young in India have been recorded in January, March and July (Prater, 1965). Longevity in the wild is unknown; Jones (1982) cites a record for a captive individual of 13 years 2 months.

THREATS TO SURVIVAL AND DOMESTIC USE

Evidence suggests that pangolins in general can adapt well to modified habitats provided their termite food source remains abundant and they are not unduly persecuted (Prater, 1971, Zoological Survey of India, 1994 and see accounts for other *Manis species*). From this it would seem that the principal factor affecting the species is exploitation, in the case of *Manis crassicaudata* largely for meat and for medicinal purposes (see below).

Bangladesh Pangolins (almost certainly this species, although conceivably also *M. pentadactyla* (see relevant account)) were reported in the 1980s to be regularly collected in hill forest areas for consumption of meat and collection of scales (Bangladesh CITES MA *in litt.* to IUCN Conservation Monitoring Centre, 1986).

India Parts of Pangolin are used for traditional medicine. The scales are used as magical charms to bring good luck. They are also used as a curative for haemorrhoids and to treat toxicosis, inflammation, rheumatic pain and scabies (Mitra, 1998). Groombridge (*in litt.*, 1999) noted that the Kadars of the Anaimalai Hills in Kerala, southern India, regard pangolins as a favourite food, though catch them infrequently.

At least 15 specimens are reported to be caught annually for meat and scales in Kanyakumari district in southern India; in 1998, two specimens were reportedly caught alive (Mohan *in litt.* to TRAFFIC India, 1999). Local trade in scales and meat is said to continue in West Bengal and Orissa (Mitra, 1998), and trade in the species is reported in Manipur, Mizoram and Tripura (TRAFFIC India *in litt.* to TRAFFIC International, 1998). In 1998 retail prices of Rs 4-5 (around US\$0.12) per scale were quoted (Mitra, 1998).

Use in most of India almost certainly involves *M. crassicaudata*. The other species occurring in the country (*M. pentadactyla*) is confined to the north-east (see relevant account).

Pakistan Hakims (practitioners of traditional medicine) consider various parts of its body to be a valuable source of medicines (Roberts, 1977).

INTERNATIONAL TRADE

Recorded international trade in pangolin products recorded by CITES generally involves skin and scales, although there is also evidence of considerable cross-border trade in pangolins for meat in East and South-

east Asia (see accounts for *Manis javanica* and *M. pentadactyla*). Scales are used for medicinal purposes while skins are used for the manufacture of leather goods, principally boots.

No trade in *M. crassicaudata* has been reported by CITES Parties in the period 1984-1996, nor has any trade in *Manis* spp., specified or otherwise, been reported by any of the four definite range states of *M. crassicaudata* since 1991. A minimum of just over 5700 skins of *M. crassicaudata* was reported in trade in the period 1980-1983. However, the great majority of these had reported origin in countries outside the range of *M. crassicaudata* and it is possible that they were misidentified or misdeclared skins of other Asian *Manis* spp (Broad *et al.*, 1988).

CONSERVATION MEASURES

Manis crassicaudata is legally protected in all countries where it definitely occurs.

Bangladesh All pangolins are legally protected (Bangladesh CITES MA *in litt.* to IUCN Conservation Monitoring Centre, 1986).

India *Manis crassicaudata* and *M. pentadactyla* are totally protected, being included in Schedule I of the Wildlife Protection Act 1972. Two seizures of pangolin scales in West Bengal have been reported for the period 1991-1996 (Bhattacharyya, 1998). These are likely to have comprised *M. crassicaudata*, this being the only species known to occur in West Bengal.

Pakistan *Manis crassicaudata* is completely protected under the Islamabad Wildlife (Protection, Preservation, Conservation, and Management) Ordinance, 1979 and the North-West Frontier Province Wildlife (Protection, Preservation, Conservation, and Management) Act, 1975.

Sri Lanka Hunting of *Manis crassicaudata* is prohibited (Broad *et al.*, 1988).

CAPTIVE BREEDING

Pangolins are difficult to maintain in captivity, mainly, it seems, because of their specialised diet (Roberts, 1977). However, captive birth of *M. crassicaudata* has occurred (Ogilvie and Bridgewater, 1967). It is not known how many of any of the species are held in captivity at present.

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Government of India, Calcutta.

Manis gigantea Illiger, 1815

Giant Pangolin
Pangolin gigante
Pangolin géant

Order: PHOLIDOTA

Family: Manidae

SUMMARY

The largest extant pangolin species, one of four occurring in Africa. Widespread in western and central Africa but evidently uncommon and thought to be declining. Terrestrial, solitary and nocturnal, occurring in high rainfall areas. Subject to widespread exploitation for bushmeat and traditional medicine and probably featuring in informal cross-border trade in some areas. Listed in Appendix III of CITES by Ghana until 1995, when it was transferred to Appendix II. No trade has been recorded by CITES for the period 1991-1996.

The species is recommended under Decision 10.79 for inclusion in category d (iii).

DISTRIBUTION & POPULATION

Occurs in western and central Africa as far east as Uganda. The limits of its range are poorly known and the scarcity of records indicates that it is generally uncommon; it is thought to be declining throughout its range (Bräutigam *et al.*, 1994).

Angola Recorded by Horsten (1982).

Benin Sayer and Green (1984) note that the species was recorded from Batia on the border of the Pendjari National Park in the north of the country in the early 1970s. On the basis of more recent records for nearby Burkina Faso and Niger, they thought that the species may have still been widespread but rare in the northern savannahs.

Burkina Faso Sayer and Green (1984) refer to recent sightings in the country, near to the border with Benin.

Cameroon Recorded by Jeannin (1936). Reported in IUCN (1987) to occur in the Douala-Edea faunal reserve in the south of the country.

Central African Republic Recorded by Bousquet (1986) as present but rare in the Manova-Gounda-St Floris National Park and as present in the Bamingui-Bangoran Biosphere Reserve.

Congo Recorded as widespread by Malbrant and Maclatchy (1949).

Democratic Republic of Congo Rahm (1966) stated that the species was believed to occur throughout the forested part of the country. There was a good number of records for the north and north-east but very few for the rest of the country. It was occasionally found in the Bunyakini region in the east.

Côte d'Ivoire Recorded as present in Tai National Park (FGU-Kronberg, 1979).

Equatorial Guinea Recorded by Basilio (1962).

Gabon Apparently widespread (Malbrant and Maclatchy, 1949; Pagès, 1970).

Ghana Recorded by Booth (1960); reportedly present but very rare in Bia National Park (IUCN, 1987).

Guinea Bourque and Wilson (1990) noted that the species was apparently recognised by hunters in two classified forest regions, and also reported traces of an individual in the Forêt Classée de Ziamá.

Guinea-Bissau No information, although the country lies within the known range of the species.

Liberia Recorded by Strong (1930) and Kuhn (1965). Coe (1975) reports a sight record from the vicinity of Mt Nimba.

Niger Sayer and Green (1984) refer to recent sightings in the country, near to the border with Benin. Brautigam *et al.* (1994) report it as extinct.

Nigeria Rosevear (1953) included the species in his checklist of Nigerian mammals, but cited no actual records. Happold (1987) excluded it from his checklist of Nigerian mammals without comment. IUCN (1987) lists the species amongst the fauna of Kainji Lake National Park. Nigeria lies within the range of the species, and it may therefore be expected to occur.

[**Rwanda** Reported extinct by Bräutigam *et al.* (1994).]

Senegal Recorded as present, though evidently rare by Dupuy (1968).

Sierra Leone Reported as present and apparently widespread by Davies (1984), on the basis of reports received. Also recorded by Teleki (1980).

Togo No information.

Uganda Definite records mapped by Kingdon (1971) are in the southern and western parts of the country. The species may be largely allopatric with *M. temminckii*, which has been recorded in northern and eastern parts. Indicated by Kingdon (1971) to have been not uncommon in some areas at that time.

[**Burundi** No records located; presence doubtful.]

[**Chad** No records located and not included by Malbrant (1952) in his account of mammals of the region.]

[**Gambia** No records located; presence doubtful.]

[**Kenya** Not known to occur, although Kingdon (1971) thought it might possibly be found in western Kenya..]

[**Mali** No records located; occurrence doubtful.]

[**Mauritania** No records located; occurrence doubtful.]

[**Sudan** No records located; occurrence doubtful.]

[**Tanzania** No records located; occurrence doubtful.]

HABITAT AND ECOLOGY

A little known terrestrial species, reported from savannah, forest and swampland in areas of high rainfall with no prolonged dry season. Malbrant and MacLachy (1949) noted that the species appeared particularly to prefer montane forest, while Kingdon (1971) observed that in Uganda it was generally found at low to medium altitudes, being particularly widely distributed in the forest-savannah-cultivation mosaic typical of western and southern Uganda. Like other pangolins, a specialised feeder on termites and ants and generally found in areas with an abundance of the former (Kingdon, 1971). Nocturnal, spending the day in burrows which may reportedly reach a length of 40 m, often ending in an enlarged chamber in the centre of a termitary. Disused Aardvark *Orycteropus afer* burrows may also be used. Anecdotal evidence indicates that, as in other pangolins, individuals have a well-defined home range and are generally solitary, although two adults and one young have reportedly been found together in one burrow (Kingdon, 1971). No information on the extent of home ranges has been located. The few births that have been recorded were of single young (Kingdon, 1971). Gestation periods for other African pangolins have been estimated at around 140-180 days (see relevant accounts).

THREATS TO SURVIVAL AND DOMESTIC USE

As with other African pangolins, *Manis gigantea* is evidently subject to widespread exploitation for bushmeat and traditional medicine (Brautigam *et al.*, 1994). It appears to be recorded far less frequently in use than either *M. tricuspis* (with which it is largely sympatric) or *M. temminckii* (with which it is largely, and possibly entirely, allopatric). This would appear almost certainly a result of its considerably greater rarity.

Congo Recorded in local trade by Dowsett and Dowsett-Lemaire (1991) and Wilson and Wilson (1991).

Democratic Republic of Congo Colyn *et al.* (1987) found that this species comprised one-tenth of the total number of pangolins (~100) seen for sale as bushmeat in rural areas around Kisangani from September 1980 to January 1984.

Gabon A survey of bushmeat trade in 1993 found that, in markets at least, pangolins were one of the least commonly sold meats comprising less than 5% of sales overall, but that nevertheless consumer demand, as judged by price, appeared to be high. Most observed trade was in *M. tricuspis* but a total of 23 *M. gigantea* (compared with 120 *M. tricuspis*) were observed on sale at four bushmeat markets scattered throughout the country. Most bushmeat in the country is reportedly sold informally and not in markets; the extent of this trade has not been quantified (Steel, 1994)

INTERNATIONAL TRADE

Until 1995, *Manis gigantea* was listed in Appendix III by Ghana. It was then transferred to Appendix II. No trade in this species has been recorded for the period 1991-1996. The only trade in this species recorded in CITES annual reports is of four live specimens reported as exported from Togo in 1984.

The only other CITES reported trade in the period 1991-1996 which could possibly be of this species is of a single leather item of an unspecified *Manis* species imported by the USA from Nigeria in 1994. This record is much more likely to have been of *Manis tricuspis*, evidently the most abundant, widespread and heavily used species in the country. In 1990, Republic of Korea customs statistics noted import of 100 kg of unspecified pangolin scales from Madagascar (a non-range state for any pangolin) (Brautigam *et al.*, 1994). This could conceivably have been of this species, but is far more likely to have been simply a reporting error.

CONSERVATION MEASURES

The species is legally protected in a number of countries within its range (Brautigam *et al.*, 1994), although such protection is unlikely to be fully enforced. It is known or suspected to occur in a number of protected areas within its range (see records under "Distribution and Population" above for **Benin**, **Central African Republic**, **Cameroon**, **Côte d'Ivoire**, **Ghana** and **Nigeria** and see also IUCN (1987)).

CAPTIVE BREEDING

The species has reportedly been kept in captivity, but is not known to have bred; pangolins in general are difficult to maintain in captivity (Wilson, 1994).

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Manis javanica Desmarest, 1822

Malayan Pangolin
Pangolin malayo
Pangolin malais

Order: PHOLIDOTA

Family: MANIDAE

SUMMARY

One of three Asiatic species of pangolin, occurring in tropical South-East Asia. A solitary, secretive and largely nocturnal species whose numbers are extremely difficult to assess. Intensively used for its skin, meat and scales (which are used for medicinal purposes) and evidently subject to extremely heavy collection pressure in many parts of its range. The species is both used locally in most or all countries where it occurs and traded internationally. Trade reported by CITES for the period 1991-1996 was almost all in leather or leather products (the great majority exported from Lao PDR) and other parts and derivatives. Observations in mainland east and south-east Asia indicate that there is also very heavy unofficial or at least unrecorded cross-border trade in pangolins and pangolin products, particularly into China. Reported prices paid to collectors for pangolins in range states of this species are very high (equivalent to several tens of dollars per individual) compared with typical rural wages and the incentive to collect is therefore high. Anecdotal evidence from parts of the range, particularly Lao PDR, indicate that collecting pressure has led to major population declines, which continue.

The species is recommended under Decision 10.79 for inclusion in category d (i).

DISTRIBUTION AND POPULATION

Occupies tropical South-East Asia. The northern and western limits of its range are very poorly defined. Recorded from much of Indonesia, Malaysia, Palawan Province in the Philippines, at least the southern half of Indo-China, much of Thailand and southern Myanmar (Burma), conceivably also in Bangladesh and south-west China although occurrence in both these countries remains highly conjectural. Being secretive, solitary and nocturnal the species is rarely observed, and no population estimates have been located. The species is classified as 'lower risk (near threatened)' by IUCN (1996) and was reviewed in detail under the CITES Significant Trade process in 1992 (WCMC and IUCN/SSC (1992)).

Brunei Presumably present (Medway, 1977).

Cambodia Although no definite records have been located, the species almost certainly occurs, being recorded from all adjacent countries.

Indonesia Van der Zon (1977) noted its distribution in Indonesia as: Sumatra, Kiau and Lingga archipelago, Bangka and Belitung, Nias and Pagi islands, Kalimantan, Java and Bali. Habitat was given as lowland rainforest but also near human settlements, up to 1000m. It was reported at that time to be common.

Lao PDR (Laos) Evidently widespread. Duckworth *et al.* (1999) note that recent records are from a wide range of areas below around 600 m altitude, from Xe Pian NBCA (National Biodiversity Conservation Area) in the south at least as far north as Nam Kading; its latitudinal range was thought likely to overlap considerably with that of *Manis pentadactyla*, the latter generally occupying higher altitude areas. Duckworth (*in litt.* 1999) speculated that *M. javanica* in Lao PDR might be restricted to the Mekong plain and adjacent foothills to around 3000 feet (ca 900 m) altitude, possibly also occurring on the Bolaven Plateau. According to Deuve and Deuve (1963), *M. javanica* was found throughout the Mekong Valley at least as far north as Luang-Prabang Province. Duckworth *et al.* (1999) noted that although reported by hunters to be still widespread, numbers seemed low; in no areas were field sightings common, nor were tracks found particularly frequently. They further noted that in three separate areas within the range of *M. javanica* (Xe Pian, Dong Phou Veng and Khammouan Limestone NBCA) villagers had recently reported that pangolin populations had declined, in some areas to as little as 1% of the level 30 years ago. Duckworth *et al.* (1999) considered the species to be At Risk in Lao PDR (the highest national category of threat).

Malaysia Medway (1977) stated that it was widespread and not uncommon throughout the mainland of West Malaysia, primarily in forest but also in gardens and plantation, including rubber; it was also found

on the island of Penang. The species is reportedly widespread on Borneo, from sea-level to an altitude of 1700 m on Gunung Kinabalu in Sabah (Payne *et al.*, 1985), though Proud (*in litt.*, 1981) noted that it appeared to be absent from the extensive peat swamp forests of Sarawak. In Sabah, Davies and Payne (1982) noted that the species was rarely seen though was evidently widely distributed, being known by local people throughout Sabah. In particular it was reliably reported to be present in the cultivated areas between Tawau and Merotai (to the south-west of the Tawau Hills national park) and sightings were made in gardens in the Sandakan area and in Sepilok Nature Reserve; although more often recorded in cultivated areas than forest, it is not clear whether it was more abundant in the former, or simply more often seen (Davies and Payne, 1982).

Myanmar (Burma) Noted by Salter (1983) as probably widespread though with no recent data on status; distribution in Corbett and Hill (1992) given as southern Myanmar.

Philippines Occurs on the main island of Palawan and on the islands of Busuanga and Culion in the Calamian Group in northern Palawan Province (Anon., 1979; Alvarez *in litt.* 1982).

Singapore According to Doggett (*in litt.*, 1981) the species was still found in the wild in Singapore at that time, though in very small numbers.

Thailand Occurs throughout Thailand, preferring forest but also found in rubber plantations and other more settled areas; noted in 1990 as considered threatened and becoming increasingly rare (Boonsong Lekagul and McNeely, 1977; Humphrey and Bain, 1990).

Viet Nam There are locality records from Kontum Province, Tay Ninh Province and Quang Nam Province (van Peenen *et. al.*, 1969); Bourret (1942) noted that the species was often found in Cochinchina.

[China There are no definite records; however, a reference in Allen (1938) (cited recently in Zhang (1997) to the presence of *M. crassicaudata* (see relevant account) in the region of Bhamo and adjacent mountains in north-east Myanmar and extreme western Yunnan may conceivably refer to this species.]

[Bangladesh Khan (1985) noted that the species could possibly occur in Bangladesh, though there were no specimens or sight records; Husain (1974) listed it for the country but gave no details. The country lies well to the west and north of the species's confirmed range; its occurrence here seems unlikely.]

HABITAT AND ECOLOGY

Manis javanica is reported to occur in a wide variety of habitats, including primary and secondary forest and cleared and cultivated areas including gardens and rubber plantations; like other pangolins it is nocturnal, solitary and a specialised feeder on ants and termites (Boonsong Lekagul and McNeely, 1977; Davies and Payne, 1982; Foenander, 1953; Harrison, 1974; Medway, 1969; Medway, 1977). Inference from other species indicates that one young is born at a time, after a gestation period of at minimum 130 days.

THREATS TO SURVIVAL AND DOMESTIC USE

Observations suggest that the species is well able to adapt to secondary forest and other modified habitats (see 'Habitat and Ecology' above). It is highly unlikely therefore to be threatened at present by habitat conversion or modification. However, the species is intensively used – for its skin, meat and scales – and is evidently subject to heavy collection pressure in many parts of its range. The species may be harvested for local (i.e. national-level) use, or for export either before or after processing. Observations in mainland south-east Asia, discussed in more detail below, indicate that there is very heavy unofficial, or at least unrecorded, cross-border trade in pangolins and pangolin products. It is not possible at present to disentangle this trade from local use, so this section should be read in conjunction with the section on international trade below. Moreover, most observations on use of pangolins in Asia do not distinguish reliably between this and the other two Asian species (*M. crassicaudata* and *M. pentadactyla*). Because several countries have populations of both *M. javanica* and *M. pentadactyla* (most significantly Lao PDR, Myanmar and Viet Nam), the two species that feature most prominently in trade, it is often impossible to determine which species is referred to in both local use and export. Accounts of these two species should therefore be read together.

In the absence of any concrete population data, or indeed of any true measure of the number of pangolins taken each year, it is extremely difficult to assess the impact of harvest on the species. Indications, from national use and international trade summarised below, are that at minimum several tens of thousands have been harvested and traded annually during the 1990s. These evidently comprise both *Manis javanica* and *M. pentadactyla*, although there are indications that the former is more abundant in trade than the latter. Figures discussed in detail in Broad *et al.* (1988) and WCMC and IUCN/SSC (1992) indicate that trade of this magnitude also took place at least up until the mid-1980s (e.g. over 185,000 skins reported in international trade by CITES in the period 1980-85 alone), while Harrison and Loh (1965) estimate that in the late 1950s and early 1960s scales of some 10,000 pangolins a year (of *Manis javanica*) were exported from Borneo.

The maintenance of trade of this magnitude over several decades might arguably imply that the harvest is sustainable. However, evidence suggests that the origin of the animals in trade has shifted as populations have become depleted and also as protective measures have been imposed in various parts of its range. CITES data indicate that until the mid-1980s, most was declared as originating in Thailand, Indonesia or Malaysia (Broad *et al.*, 1988; WCMC and IUCN/SSC, 1992). It now seems that most recorded trade originates in Lao PDR (see below). Thailand, Indonesia and Malaysia have all now included pangolins as protected species, implying concern about their status in these countries, and have stopped exports (see below). Both species occurring in Lao PDR (*Manis javanica* and *M. pentadactyla*) are now included in a provisional list of the most threatened animal species in the country (Duckworth *et al.*, 1999). As discussed below, and in the account for *M. pentadactyla*, price information both in consuming countries (e.g. China and Republic of Korea), and even more significantly, in areas where pangolins are harvested (north-east India, Lao PDR, Myanmar) indicates that pangolins are now a very valuable commodity. In both north-east India and Myanmar, a single live pangolin is reported to be worth at least US\$ 50 (see below and account for *M. pentadactyla*). Annual gross domestic product per capita (a measure of mean annual income) in India in 1995 was US\$ 425; average income in rural north-east India is almost certainly far less than this (UNDP, 1998). Recent data are not available for Myanmar, although per capita GDP is believed considerably lower than India's (UNDP, 1998). A single pangolin is therefore worth at local prices at the very minimum one month's rural wages. The incentive to collect is clearly very high indeed. Evidence from African pangolins suggests that pangolins have quite large home ranges (in the case of *M. temminckii* several hundred hectares) and a relatively low reproductive rate (one or at the very most two young per female per year). It may be inferred therefore that collection of pangolins presents a significant threat. Their secretive and nocturnal habits may well prevent them ever being completely collected out from more inaccessible areas, but it does seem as if populations can be reduced to a very small fraction of their former size (see account for Lao PDR above).

Cambodia Martin and Phipps (1996) note that *Manis javanica* is obtained from most parts of Cambodia. Dried pangolins and their claws were observed for sale at O Russei market in the early 1990s and stuffed pangolins were seen on sale at souvenir shops. Live pangolin reportedly cost R5000 (US\$ 2) per kg at the time and pangolin meat, scales and blood were on sale in at least one restaurant. It was reported that Thai customers paid Bt500 (US\$ 20) for skin and scales of one animal; this had resulted in higher prices for these products in Cambodia (Martin and Phipps, 1996).

Indonesia *Manis javanica* is reportedly hunted for food by rural communities in inland areas of East Kalimantan (Caldecott and Nyaoi, 1985, Caldecott 1988, in MacKinnon *et al.* 1995); the scales are reportedly traded for cash. Pangolin meat and live specimens can reportedly be found on sale in Jakarta, Java, and Medan, North Sumatra and in rural markets in North Sumatra. In and around Medan, live specimens reportedly sell for US\$ 2.50-12.00 each (TRAFFIC Southeast Asia *in litt.*, to TRAFFIC International, March 1999). In July and August 1996 prices in East Java for live pangolins were reportedly 78,000 IDR (about US\$ 30 at the exchange rate of about 2600 to the dollar before the economic crisis) at market price, 5,000 IDR (US\$ 1.90) for first level-middlemen price and 2,000 IDR (US\$ 0.80) at source from the hunter (Theile, *et al.*, *in prep*). In both Java and Sumatra, local people believe the flesh can cure dermatitis and some allergies (Theile, *et al.*, *in prep*) and the tongue is reportedly used as a protection against harmful magic (TRAFFIC Southeast Asia, *in litt.*, to TRAFFIC International, March 1999). *Manis javanica* parts are commonly sold in Traditional Chinese Medicine shops in the city of Medan (TRAFFIC Southeast Asia, *in litt.*, to TRAFFIC International, March 1999).

Lao PDR Pangolins (both this species and *M. pentadactyla*) are eaten in rural Lao PDR, and are widely available in urban food markets and restaurants; overall domestic use is believed relatively low, although

not entirely insignificant, compared with collection for export (Duckworth *in litt.*, 1999). Duckworth *et al.* (1999) note that pangolins are the most heavily traded animal in Lao PDR, at least through Ban Lak (20), with *M. javanica* outnumbering *M. pentadactyla*. They thought that pangolin scales may generate the largest trade in any single wildlife product in the country. In a period of 4-5 months in 1998 over 100 pangolins (total weight 200-300 kg) were reported to have been taken from one village in Dong Khanthung PNCBA alone. Indications from seizures (e.g. over 200 kg seized in three days in late 1997 in and around Ban Lak (20) and 570 kg confiscated in two months in 1998 in Khamkeut District, Bolikhamxai Province) were that these figures were by no means exceptional (Duckworth *et al.*, 1999). Incentives to collect pangolins are clearly extremely high. One villager is said to have realised over a million kip (US\$ 500) in the 1997/1998 dry season; this allowed him to buy three buffalos, and compares with the 1995 annual per capita GDP (a measure of mean annual income) in Lao PDR of US\$ 363 (UNDP, 1998). Major seizures of pangolins are all believed destined for export, primarily to Viet Nam and, speculatively, thence to China (Duckworth *in litt.*, 1999). According to CITES annual reports some skins of Lao origin have also been exported by Thailand (see Thailand in 'International Trade' below).

Malaysia Pangolin scales are believed to cure asthma (Che Ismail, 1989). In Sabah and Sarawak, the pangolin is hunted for food (Caldecott and Nyaoi, 1985) and the scales are reportedly used as a protection against witchcraft (Hoi-Sen, 1977). In West Malaysia habitat loss, particularly the opening of new areas to oil palm monoculture, is reportedly one of the main threats. Road kills are also apparently common. The species is reportedly very rarely seen for sale although pangolins are caught whenever possible for local consumption as food and medicine (Dr. Dionysius Sharma, WWF-Malaysia, *in litt.*, to TRAFFIC Southeast Asia, March 1999).

Myanmar Live pangolins and scales are brought to Yangon (Rangoon) and Mandalay from where they are reportedly exported to the Chinese border city of Shweli through the Myanmar border town of Musae. There is also reportedly trade into Thailand through the border town of Tachilek. It was reported in 1999 that pangolins were sold for ca US\$ 50 each in Yangon and ca US\$ 65 in Musae. One kg of scales was reportedly worth around US\$21 in Myanmar and could sell for RMB 20 per scale (US\$2) in Shweli, China. Trade is likely to be in both *M. javanica* and *M. pentadactyla* (U Tin Than, WWF Thailand, *in litt.*, to TRAFFIC International, March 1999). Pangolins are reportedly also popularly used by the Burmese in traditional medicines (U Tin Than, WWF Thailand, *in litt.*, to TRAFFIC Southeast Asia, February 1999).

Viet Nam Pangolins (the majority *Manis javanica* rather than the rarer *Manis pentadactyla*) are reportedly the most abundant species in trade (see below). The scales in particular are used in traditional Vietnamese medicine (J. Compton, *in litt.*, to TRAFFIC Southeast Asia, February 1999).

INTERNATIONAL TRADE

Trade up to 1991 in *Manis javanica*, particularly that recorded in CITES annual reports, is discussed in detail in Broad *et al.* (1988) and WCMC and IUCN/SSC (1992). This section provides an update of that information. As noted in WCMC and IUCN/SSC (1992) the vast majority of CITES-reported trade is in leather or leather products and other parts and derivatives (much of it classified as scales, the vast majority of the remainder almost certainly also scales); trade in live animals or bodies recorded by CITES is negligible by comparison (and by comparison with cross-border trade in Southeast and East Asia discussed below). The range states for which substantial exports (over 1000 skins or kg of skins or scales declared in total for the period 1991-1996) were recorded in CITES annual reports are: Indonesia; Lao PDR; Malaysia; Singapore and Thailand. Overall, some 80,000 skins (plus a few thousand kg of skins) were recorded in CITES annual reports as exported by range states in the years 1991-1996, the vast majority from Lao PDR. In addition, some 7500 kg of scales were recorded as exports by Malaysia. Using the figure in Harrison and Loh (1965) of 1.5 kg of scales per pangolin, which is probably generous (see account for *Manis pentadactyla*), this would account for some 5000 animals.

Exports from range states

Indonesia Mexico (a major leather-processing nation (WCMC and IUCN/SSC, 1992)) recorded importing 10,000 skins from Indonesia in 1991; no subsequent exports have been recorded, and as noted below the country has authorised no export quotas at least since 1995.

Lao PDR The country is not a Party to CITES and so all CITES information is derived from reports from importing countries. During the period 1991-1996 over 68,000 skins, some 1600 kg of skins and nearly 1000 square metres of skin were exported, the great majority to the USA and Mexico. As noted above, there is intensive harvesting of pangolins in Lao PDR, although most are now believed destined for Viet Nam and, speculatively, thence to China. It seems likely that the skins exported were at least in part processed by the tanning factory in Vientiane which is now apparently shut (Duckworth *in litt.*, 1999).

Malaysia Recorded exports from Malaysia consisted of 2000 kg of scales in 1994, 5500 kg of scales in 1996 and 2500 kg of skins in 1996, all to Singapore. With the exception of the 1994 scales, which were reported both by Singapore and Malaysia, this trade has only been recorded by Singapore.

Singapore Exports of 370 skins and 6000 kg of scales were reported from Singapore, the former destined for Mexico and Japan, the latter for China. The country is clearly an entrepôt and not a producing nation and has indeed reported the import of 590 skins from Viet Nam, 2500 kg of skins from Malaysia and 7500 kg of scales from Malaysia during the period.

Myanmar As noted in the previous section, there is reportedly cross-border trade in pangolins (presumably both this and *Manis pentadactyla*) from Myanmar into Thailand and China.

Thailand In 1992 Mexico reportedly exported just under 1300 skins of origin Thailand to the USA. In 1995 the USA reported imports of 300 skins from Thailand and a further 266 skins from Thailand with reported origin Lao PDR.

Viet Nam Compton and Le Hai Quang (1998) estimated that, conservatively, at least 400 pangolins were smuggled from Viet Nam to China by land border crossings each week. They were typically seen in cargoes of 50-100 animals. The species involved have not been identified (Compton *in litt.*, 1999); they may be expected to comprise both *Manis javanica* and *M. pentadactyla*. Vietnamese middlemen, in 1997-98, reportedly bought pangolins for around VND250,000 (US\$19) per kg and sold them to Chinese buyers across the border for VND400,000 (US\$31) per kg. However, information collected in the Tay Nguyen plateau in Vietnam's central highlands in January 1999 revealed that the price paid by middlemen is as high as VND450,000 (US\$35) per kg (J. Compton, WWF Indochina, *in litt.*, to TRAFFIC Southeast Asia, 8/02/1999). Li and Li (1997) also report that 600-800 pangolins were imported into China at a single port on this border on 27 July 1994. If these figures are reliable, and there is no reason to assume that they are not, this trade dwarves that recorded in CITES annual reports, which record exports of 590 skins from Viet Nam in the period 1991-1996.

Importing countries

China As discussed in the account for *Manis pentadactyla*, pangolin products are in very high demand in China. Information from the State Administration of Traditional Chinese Medicine (SATCM) (1996) indicates that at least since the early 1990s supply of pangolin products in China has been very largely from imported animals or their parts. Observations from Viet Nam (above) and from Guangxi Province (Li *et al.*, 1996 – see account for *M. pentadactyla*) indicate that very large numbers are traded across the Sino-Vietnamese border. There is no sign of these in CITES annual report statistics. Chinese Customs statistics do not have a specific category for recording imports of pangolins, their parts or derivatives. Incomplete data in Song (1996) indicate imports of 14.7 mt of pangolin scales in 1990, 62.8 mt in 1991 and 17.8 mt in 1995.

Republic of Korea The Korean Pharmaceutical Traders Association (KPTA) (1993-1998), whose data are more complete than those of the Korean Customs Service (TRAFFIC East Asia *in litt.*, 1999), indicate the import some 55 mt of pangolin scales (unspecified species) in 1993 and 2 mt in 1994. Of the 1993 imports, 28 mt were from China, 15.5 mt from Viet Nam and 10.6 mt from Indonesia; the 1994 import was from Viet Nam. Both *Manis javanica* and *M. pentadactyla* are present in Viet Nam while only the former is present in Indonesia and probably only the latter in China (which does, however, evidently import a very large proportion of its pangolin product from countries where both species are present). Using the figure in Harrison and Loh (1965) of 1.5 kg of scales per pangolin (for *Manis javanica* in Borneo), then the total import of 57 mt would represent just under 40,000 animals. Using the figure of 3-4 pangolins per kg of scale provided by TRAFFIC India (*in litt.*, 1999 – see above) for *Manis pentadactyla* in north-east India, then the number of animals would be five to seven times this.

No import has been recorded either by the KPTA or the Customs Service since then (TRAFFIC East Asia *in litt.*, 1999). Korea became a Party to CITES in 1993, but did not report the 1993 or 1994 imports. The exports from China and Indonesia were unrecorded in these countries' respective annual reports, despite both being Parties to CITES at the time.

Wholesale import value for scales in 1993 and 1994 were US\$ 15-16 per kg (KPTA, 1993-1998); in 1999 wholesale prices were reportedly US\$ 111 per kg, retail prices US\$ 117 per kg (TRAFFIC East Asia *in litt.*, February 1999).

USA and Mexico According to CITES annual reports, these two countries remain the major importers of pangolin leather, accounting for the vast majority of that recorded in trade. Imports to the USA continued until at least 1996, when the country reported the import of over 8000 skins from Lao PDR.

Recorded imports to other countries are negligible by comparison.

Gross exports of *Manis javanica*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	total	average
BEL		MX	20	13	0	0	0	0	33	5.5
BOD		HK	0	2	0	0	0	0	2	0.3
BOD		JP	1	0	0	0	0	0	1	0.2
BOD		KR	0	0	1	0	0	0	1	0.2
BOD		PH	1	1	0	0	0	0	2	0.3
BOD		TH	1	0	0	0	0	0	1	0.2
BOD		VN	1	2	2	2	0	0	7	1.2
BOD		XX	1	0	0	1	3	0	5	0.8
GAR		MX	0	0	0	0	0	9	9	1.5
LIV		ID	0	0	0	5	0	0	5	0.8
LPS		US	0	0	0	12	0	0	12	2.0
SCA	KG	MY	0	0	0	2000	0	5500	7500	1250.0
SCA	KG	SG	0	0	0	2000	0	4000	6000	1000.0
SHO		JP	0	0	0	0	0	2	2	0.3
SHO		MX	124	700	187	44	209	0	1264	210.7
SHO		US	17	6	26	6	6	4	65	10.8

SHO		ZA	0	0	0	0	39	0	39	6.5
SKI		ID	10000	0	0	0	0	0	10000	1666.7
SKI		JP	0	0	0	0	0	42	42	7.0
SKI		LA	8519	19688	16083	6553	9485	8093	68421	11403.5
SKI		MX	55	1282	0	0	0	159	1496	249.3
SKI		SG	0	0	220	0	150	0	370	61.7
SKI		TH	0	0	0	200	566	0	766	127.7
SKI		TW	148	0	0	0	0	0	148	24.7
SKI		US	300	402	16	1806	961	1044	4529	754.8
SKI		VN	0	220	220	0	150	0	590	98.3
SKI	KG	LA	0	1572	0	0	6	0	1578	263.0
SKI	KG	MY	0	0	0	0	0	2500	2500	416.7
SKI	KG	ZA	0	0	0	0	0	8	8	1.3
SKI	MTR	LA	470	0	0	0	0	0	470	78.3
SKI	SQM	LA	60	368	0	0	63	0	491	81.8
SKO		LA	0	0	0	14	750	0	764	127.3
SKO		MX	91	41	0	0	1	1	134	22.3
SKO		US	10	3	7	0	1	3	24	4.0
SKO		ZA	0	0	0	0	0	136	136	22.7
SKP		MX	0	0	10	0	0	0	10	1.7
SKP		US	8	0	56	913	309	0	1286	214.3
SKP	KG	US	0	0	0	0	108	0	108	18.0
SKP	KG	ZA	0	0	0	0	6	8	14	2.3
SKP	PND	US	0	0	0	0	0	85	85	14.2

CONSERVATION MEASURES

Bangladesh All pangolins are legally protected (Bangladesh CITES MA, *n litt.* 1986).

Brunei No information.

Cambodia No information.

Indonesia Protected in Indonesia since 1931, under Wildlife Protection Ordinance No. 266 of 1931 (promulgated by the Dutch administration). Also protected under Act. No. 5 of 1990, regarding Conservation of Natural Resources and Their Ecosystems; Decree of the Minister of Forestry No. 301/kpts-II/1991 and Decree of the Minister of Forestry No. 822/kpts-II/1992. No export quota was issued for the period 1995-1998 (TRAFFIC Southeast Asia *in litt.*, 1999).

Lao PDR. The country is not a party to CITES. The legal status of pangolins in Lao PDR is unclear, as a result of internal contradictions in Lao laws applicable to wildlife and wildlife trading. However, Provincial and District Agricultural and Forestry Offices have been confiscating large numbers of pangolins, and so there is evidently a perceived legal basis for doing so. No harvesting or trading management programmes are in place, other than ad hoc confiscation of sacks of pangolins (often mixed with freshwater turtles). A number of measures are being formulated, and some are being undertaken. These include: stepping up of border patrols; declaration of protected areas and initiation of management within them; recognition that pangolins are under major threat and in need of a high priority in conservation activities; upgrading national wildlife laws; public education and awareness (Duckworth, J.W. *in litt.*, 1999).

Malaysia Totally protected in West Malaysia under the Protection of Wild Life Act, 1972; a protected species, banned from local trade, in Sarawak under the Wildlife Protection Ordinance 1998; and protected in Sabah under the Wildlife Conservation Bill, 1997 (TRAFFIC Southeast Asia *in litt.*, 1999).

Myanmar (Burma) The country is not a Party to CITES. In accordance with the Protection of Wildlife, Wild Plant and Conservation of Natural Areas Act 15(A), *Manis javanica* is categorized as a Completely Protected Animal. No pangolin may be caught in the wild, kept, sold or exported (TRAFFIC Southeast Asia *in litt.*, 1999).

Philippines *Manis javanica* is protected under a blanket ban on the collection of any form of wildlife in the Province of Palawan, the entire province having been declared a game refuge and bird sanctuary in 1969 (Proclamations 219 and 530-B) (Philippines CITES MA. *in litt.*, 1986).

Singapore The Pangolin is protected under the Wild Animals and Birds Act (Domestic Law) 1904 and Endangered Species Act (Import/Export, CITES Law). The penalty for breaking this law is a fine of up to S\$ 1000.00 and the confiscation of the animal or product (WCMC and IUCN/SSC, 1992).

Thailand All *Manis* spp. are classified as Protected Wild Animals under the 1992 Wild Animals Reservation and Protection Act B.E. 2535 (TRAFFIC Southeast Asia *in litt.*, 1999).

Viet Nam No specific legislative protection exists in Viet Nam for this species (J. Compton, WWF Indochina, *in litt.*, to TRAFFIC South-East Asia, February 1999).

CAPTIVE BREEDING

Manis javanica has reportedly been kept in captivity (Wilson, 1994), though no records of successful captive breeding of the species have been located.

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Manis pentadactyla Linnaeus, 1758

Chinese Pangolin
Pangolín Chino
Pangolin de Chino

Order: PHOLIDOTA

Family: MANIDAE

SUMMARY

One of three Asiatic species of pangolin, occurring in East Asia from Nepal eastwards to southern China and northern Indo-China. A solitary, secretive and largely nocturnal species whose numbers are extremely difficult to assess. Intensively used for its skin, meat and scales and evidently subject to extremely heavy collection pressure in many parts of its range. The species is both used locally in most or all countries where it occurs and traded internationally. Trade reported by CITES for the period 1991-1996 almost all took place in 1991 and 1992, mostly in the form of derivatives exported from China. However, observations in mainland east and south-east Asia indicate that there is very heavy unofficial or at least unrecorded cross-border trade in pangolins and pangolin products, particularly into China. Indications are that this trade involves at minimum several tens of thousands of pangolins annually, of this species and *Manis javanica* (see relevant account). Reported prices paid to collectors for pangolins in range states of this species are very high (equivalent to several tens of dollars per individual) compared with typical rural wages and the incentive to collect is therefore high. Anecdotal evidence from parts of the range, particularly Lao PDR, indicate that collecting pressure has led to major population declines, which continue.

The species is recommended under Decision 10.79 for inclusion in category d (i).

DISTRIBUTION AND POPULATION

Occurs in the Himalayan foothills in Nepal, Bhutan and northern India, possibly in Bangladesh, across Myanmar to northern Indo-China (with one old record also from extreme northern Thailand) and through southern China (south of the Chiangjiang) to Hainan and Taiwan. The limits of its range are poorly defined. Very little information is available on status anywhere in the species's range. The species is classified by IUCN (1996) as lower risk (near threatened) and was reviewed in detail under the CITES Significant Trade process in 1992 (WCMC and IUCN/SSC, 1992)..

Bangladesh Khan (1985) stated that the species was possibly present, though noted that there were no sight records or specimens. If present the most likely areas were the forests of Sylhet, Comilla and Chittagong Hill Tracts districts. Sarker (Bangladesh CITES MA *in litt.*, 1986) confirmed that it was likely to occur, but no records were known.

Bhutan The species may be expected to occur in Bhutan, being recorded from adjacent countries (Nepal and India) (Ellerman and Morrison-Scott, 1951).

China Described by Allen (1938) as found throughout south-east China from the southern border as far north as Changjiang (the Yangtze River); also found on the island of Chusan at the mouth of the Changjiang. Recorded by Zhang *et al.* (1997) as distributed widely in China in the following provinces: Sichuan, Guizhou, Yunnan, Anhui, Jiangsu, Zhejiang, Jiangxi, Hunan, Guangdong, Fujian and in the Autonomous Regions of Hainan Island, Guangxi Zhuang and Tibet. Recorded (as sightings or burrows) in several sites in central and north-east New Territories (Reels, 1996) and on Lantau Island although not on the smaller outlying islands of Hong Kong (TRAFFIC East Asia *in litt.*, 1999). There are no published references on the status of *M. pentadactyla* in Hong Kong although locally it is considered to be near-threatened (TRAFFIC East Asia *in litt.*, 1999).

India Recorded in north-eastern India from Sikkim eastwards (Prater, 1971; Tikader, 1983). Apparently rarely seen, Tikader (1983) noted that it was believed to have been reduced in number by hunting and accorded it indeterminate status. Reported in the 1980s as common in the undisturbed hill forests of Arunachal Pradesh (Zoological Survey of India, 1994).

Lao PDR (Laos) Recorded from the north and centre of the country (Duckworth *et al.* 1999; Timmins and Evans, 1996). Duckworth *et al.*, (1999) note that there are too few locality records to determine the geographic and altitudinal range of the species in the country with any accuracy; its latitudinal range was

thought likely to overlap considerably with that of *Manis javanica*, with *M. pentadactyla* tending to occur in hills and mountains and the latter more generally found at lower altitudes. Duckworth *et al.* (1999) noted that pangolin populations in general had been so reduced in Lao PDR by hunting that field sightings were exceptionally rare. The only recent field sighting (during 1994-1995) was of an individual in Nam Theun Extension PNBCA (Proposed National Biodiversity Conservation Area); another was seen in a village in Nakai-Nam Theun NBCA during the same period and in 1997 animals collected by villagers were seen around Nam Phoun NBCA (Duckworth *et al.*, 1999). This species is less often recorded in trade in Lao PDR than *M. javanica*. This seems likely to reflect a lower abundance in the wild. Duckworth (*in litt.*, 1999) stated that villager estimates of remaining pangolins in Lao PDR were of the order of 1-5% of levels 20 years ago. Duckworth *et al.* (1999) classified *M. pentadactyla* as At Risk in Lao PDR, the highest category of threat.

Myanmar (Burma) Noted by Salter (1983) as probably widespread, though no recent data on status were available; distribution given in Corbett and Hill (1992) as encompassing most of Myanmar with the exception of the southern part of the country, occupied by *M. javanica*. Noted by U Tin Than (WWF Thailand, *in litt.*, to TRAFFIC International, 1999) as found in the northern part of the country, including the region of Mt Popa some 100 km south-west of Mandalay.

Nepal Apparently confined to elevations below around 1500 m (Frick, 1968; Mitchell, 1975).

Taiwan Occurs in the periphery of the Central Mountain Range, the Western Foothill Range, the Taoyuan Tableland, the Ouluanpi Tableland, the East Coast Mountain Range, the Tatum Volcano Group, Taipei Basin, Puli Basin and the Pingtung Plain; the upper limit of occurrence is ca 2000 m (Chao Jung-Tai, 1989; Taiwan Forestry Research Institute *in litt.*, 1992). Reports from the late 1980s and early 1990s suggested that the population was decreasing owing to poaching and habitat destruction; it was regarded at that time as Endangered (Chao Jung-Tai, 1989; Taiwan Forestry Research Institute *in litt.*, 1992).

Thailand The only record is from Doi Inthanon in Changwat, Chiang Mai sometime in the 1930s (Allen and Coolidge, 1940).

Viet Nam All records located are from the northern half of the country, as far south as Quang Tri Province (Bourret, 1942; van Peenen *et al.*, 1969).

HABITAT AND ECOLOGY

Manis pentadactyla is largely terrestrial, though is fully capable of climbing trees and, like other pangolins, swims well (Chao Jung-Tai, 1989; Heath, 1992). In Taiwan the species has been recorded from a range of different habitats, including primary and secondary forest and *Miscanthus* grassland (Chao Jung-Tai, 1989). The species digs its own burrows, or enlarges passages made by termites. In parts of the range with pronounced seasonal variation – as in Fujian Province in China at around 27°30'N, where the species has been studied in the field (Fang and Wang, 1980 cited in Heath, 1992) – activity patterns appear to differ in winter and summer. During the winter, the pangolin apparently inhabits burrows up to 2 m deep often associated with a termite nest. Allen (1938) quotes reports stating that in Hainan (China), *M. pentadactyla* may be largely inactive during the winter season. During the summer, the pangolin makes use of numerous shorter burrows (0.8-1 metre long), with nests less than 0.5 m below the surface (Fang and Wang, 1980 cited in Heath, 1992). Indications are that home range is relatively large, although concrete data are lacking (Heath, 1992).

Like other pangolins it is nocturnal or crepuscular, emerging in the early evening and returning to its nest around 0200h (Heath, 1992). Food consists of the eggs, young and adults of termites and ants (Heath, 1992). Allen (1938) noted that in China there appeared to be a close correlation between the distribution of two termite species (*Coptotermes formosanus* and *Termes (Cyclotermes) formosanus*) and that of *M. pentadactyla*; it was assumed that these formed a major component of the pangolin's diet. Pangolins studied in Fujian Province in China reportedly depended in winter largely on the white termite *Macrotermes barneyi* and on an unidentified black species (Fang and Wang, 1980 cited in Heath, 1992).

Little is known of breeding, though in China and Taiwan young (normally one, occasionally two) are reportedly born in spring from March to May (Allen, 1938; Chao Jung-Tai, 1989).

THREATS TO SURVIVAL AND DOMESTIC USE

Limited observations (see 'Habitat and Ecology' above) suggest that *Manis pentadactyla* is able to adapt to secondary forest and other modified habitats. It is highly unlikely therefore to be threatened at present by habitat conversion or modification. However, the species is intensively used – for its skin, meat and scales – and is evidently subject to extremely heavy collection pressure in many parts of its range. It may be harvested for local (i.e. national-level) use, or for export either before or after processing. Observations in mainland east and south-east Asia, discussed in more detail below, indicate that there is very heavy unofficial, or at least unrecorded, cross-border trade in pangolins and pangolin products. In particular, China, which is a range state for *M. pentadactyla* is evidently also a major importer of both this species and *M. javanica* from neighbouring countries. It is very difficult to disentangle use of locally collected pangolins from use of imported pangolins, so that this section should be read in conjunction with the section on international trade below. Moreover, most observations on use of pangolins in Asia do not distinguish reliably between this and the other two Asian species (*M. crassicaudata* and *M. javanica*). Because several countries (most significantly Lao PDR, Myanmar and Viet Nam) have populations of both species that occur most commonly in trade (*M. javanica* and *M. pentadactyla*), and because China evidently imports both species, it is often impossible to determine which species is referred to in both local use and export. Accounts of these two species should therefore be read together.

In the absence of any concrete population data, or indeed of any true measure of the number of pangolins taken each year, it is extremely difficult to assess the impact of harvest on the species. Indications, from national use and international trade summarised below, are that at minimum several tens of thousands have been harvested and traded annually during the 1990s. These evidently comprise both *Manis javanica* and *M. pentadactyla*, although there are indications that the former is more abundant in trade than the latter. Figures discussed in detail in Broad *et al.* (1988) and WCMC and IUCN/SSC (1992) indicate that trade of this magnitude took place at least up until the mid-1980s (e.g. over 185,000 skins reported in international trade by CITES in the period 1980-85 alone), while Harrison and Loh (1965) estimate that in the late 1950s and early 1960s scales of some 10,000 a year (of *Manis javanica*) were exported from Borneo.

The maintenance of trade of this magnitude over several decades might arguably imply that the harvest is sustainable. However, evidence suggests that the origin of the animals in trade has shifted as populations have become depleted. CITES data indicate that until the mid-1980s, most trade was declared as originating in Thailand, Indonesia or Malaysia, and therefore comprised very largely *Manis javanica*. It now seems that most recorded trade originates in Lao PDR and comprises both *M. javanica* and *M. pentadactyla* (though primarily the former). Thailand, Indonesia and Malaysia have all now classified pangolins as protected species, implying concern about their status in these countries, and have stopped exports (see below). Both species occurring in Lao PDR (*Manis javanica* and *M. pentadactyla*) are now included in a provisional list of the most threatened animal species in the country (Duckworth *et al.*, 1999). As discussed below, and in the account for *M. javanica*, price information both in consuming countries (e.g. China and Republic of Korea), and even more significantly, in areas where pangolins are harvested (north-east India, Lao PDR, Myanmar) indicates that pangolins are now a very valuable commodity. In both north-east India and Myanmar, a single live pangolin is reported to be worth at least US\$ 50 (see below). Annual gross domestic product per capita (a measure of mean annual income) in India in 1995 was US\$ 425; average income in rural north-east India is almost certainly far less than this (UNDP, 1998). Recent data are not available for Myanmar, although per capita GDP is believed considerably lower than India's (UNDP, 1998). A single pangolin is therefore worth, at local prices, one month's rural wages at the very minimum. The incentive to collect is clearly very high indeed. Evidence from African pangolins suggests that pangolins have quite large home ranges (in the case of *M. temminckii* several hundred hectares) and a relatively low reproductive rate (one or at the very most two young per female per year). It may be inferred therefore that collection of pangolins presents a significant threat. Their secretive and nocturnal habits may well prevent them ever being completely collected out from more inaccessible areas, but it does seem as if populations can be reduced to a very small fraction of their former size (see account for Lao PDR above).

Bangladesh Pangolins, possibly including this species (see 'Distribution and Population' above) were reported in the mid-1980s as regularly collected in hill forest areas for consumption of the meat and collection of scales (Bangladesh CITES MA *in litt.*, 1986).

China Hunting is believed to be the main threat to pangolins and generally, once a burrow is found the pangolin may be caught within a week (Fellowes and Hau, 1997).

Confiscated *Manis javanica* may have been introduced into reserves where they may conceivably have a serious impact on the extant population of *Manis pentadactyla* (Li *et al.*, 1996), although indications from African species are that pangolins may be difficult to relocate, generally dying shortly after release (see account for *Manis temminckii*).

Scales

Pangolin scales are highly valued for their alleged medicinal value, particularly for treating a wide variety of skin diseases (Harrisson and Loh, 1965). They are believed to be antiseptic, effective in reducing high body temperature induced by septic wounds or skin trouble and in stimulating blood flow to diseased areas; they also reportedly act as catalysts, increasing the effectiveness of other medicines. Scales may be used externally or internally. In the former, raw scales are used for scratching the skin; in the latter, scales are ground to powder and then mixed with herbs boiled in water to form a decoction which when drunk is said to be particularly effective in curing skin trouble caused by venereal disease (Harrisson and Loh, 1965).

From available data it is impossible to estimate total pangolin scale use in China. However, surveys conducted between May and June of 1996 by the Chinese Academy of Science in six Chinese medicine markets showed that pangolin scales were among the most frequently observed Chinese materia medica (Guo, Y., *et al.*, 1997). As an indication of the magnitude of use, one traditional Chinese medicine company alone reported buying 70 mt of pangolin scales in the period 1990-1993 (including over 42 mt in 1990 alone) (Guo *et al.*, 1997), while in 1991 import of just under 63 mt of pangolin scales was recorded (Song, 1996).

Demand for pangolin scales is sufficiently high to lead to at least periodic shortages and major increases in price (Anon., 1995 in Guo, 1997). From 1984 to 1988 the market price reportedly increased 14-17 fold. By the early 1990s there was apparently a dire shortage of locally available scales (i.e. presumably those taken from native *M. pentadactyla*) which was alleviated by supplies from neighbouring countries (Lao PDR, Myanmar, Viet Nam). It seems that availability of these gradually decreased until 1995 when supplies collapsed leading to a dramatic increase in price (from RMB 280-300 (US\$ 34-36) per kg in the first half of 1995 on the Guangxi border to RMB 650 (US\$ 80) in March 1996) (SATCM, 1996). (Note that it is unclear whether these are retail or wholesale prices). Wholesale prices in China during 1998 averaged RMB 371 (US\$ 45) per kg (SATCM, 1998a). The Chinese Materia Medica Company Information Centre noted in both 1996 (SATCM, 1996) and 1998 (SATCM, 1998b) that there was a severe shortage of pangolin scales in China. Medicine companies have posted offers of purchase of substantial quantities (several hundred kg) of scales, further indicating that they are in short supply (SATCM, 1998c and d).

Meat

The Chinese consider pangolin a "winter" food with the power to ward off a chill; it is reportedly eaten less in the summer owing to the belief that eating "hot" foods in hot temperatures will produce nosebleeds and other ill effects (Nowell, 1991). A survey in December 1993 of restaurants in the middle/high price range along the Sino-Vietnamese border and in Nanning city (Guangxi Province) found that some two-thirds of them offered pangolin (Li *et al.*, 1996). In 1994 prices for live pangolins along the Sino-Vietnamese border were around US\$ 10-15 per kg, rising to US\$ 15-25 per kg in Guangzhou and Nanning and some US\$ 3-4 more than this in Guangdong (compared to prices of US\$ 1.5-2.5 for beef and pork); both *Manis pentadactyla* and *M. javanica* were reported in trade (Li *et al.*, 1996). In 1997-98, Chinese buyers were reportedly buying pangolins from Vietnamese middlemen for US\$31 per kg (J. Compton, WWF Indochina, *in litt.*, to TRAFFIC Southeast Asia, 8/02/1999).

India Information from TRAFFIC India (*in litt.*, to TRAFFIC International, March 1999) indicates that *Manis pentadactyla* is collected for meat and scales in various parts of Manipur, Nagaland and Assam. In 1999 it was estimated that around 25-45 kg of scales were collected monthly in Manipur; of this around 80% was believed smuggled into Myanmar, the remainder apparently being used locally. Individual agents collected 1-3 kg at a time, taking this to one of three main markets (Imphal and Moreh in Manipur and Dimapur in Nagaland) for sale. There was also reportedly some export of scales from India to Nepal

through Shimapur in Nagaland. Prices paid by the agents were reportedly in the range Rs 250-500 (ca US\$ 6-12) per kg of skin (presumably with scales), this rising to Rs 500-1000 (ca US\$ 12-24) at sale points in Imphal and Dimapur. A whole animal, including meat, was reportedly worth Rs 2000-3000 (ca US\$ 50-70). It was estimated that 3-4 animals were needed to produce 1 kg of scales (TRAFFIC India *in litt.*, to TRAFFIC International, March 1999). This figure differs considerably for that quoted by Harrison and Loh (1965) for the similarly sized *Manis javanica* on Borneo, which they considered produced some 1.5 kg of scales per animal. Using the former figure, 25-45 kg of scales per month translates very roughly to some 1000-2000 pangolins collected annually in Manipur; using the latter, the numbers of pangolins would be ca 200-350.

Lao PDR Pangolins (both this species and *M. pentadactyla*) are eaten in rural Lao PDR, and are widely available in urban food markets and restaurants; overall domestic use is believed relatively low, although not entirely insignificant, compared with collection for export (Duckworth *in litt.*, 1999). Duckworth *et al.* (1999) note that pangolins are the most heavily traded animal in Lao PDR, at least through Ban Lak (20), with *M. javanica* outnumbering *M. pentadactyla*. They thought that pangolin scales may generate the largest trade in any single wildlife product in the country. In a period of 4-5 months in 1998 over 100 pangolins (total weight 200-300 kg) were reported to have been taken from one village in Dong Khanthung PNCBA alone. Seizures, such as over 200 kg seized in three days in late 1997 in and around Ban Lak (20) and 570 kg confiscated in two months in 1998 in Khamkeut District, Bolikhamxai Province) indicate that these figures were by no means exceptional (Duckworth *et al.*, 1999). Incentives to collect pangolins are clearly extremely high. One villager is said to have realised over a million kip (US\$ 500) in the 1997/1998 dry season; this allowed him to buy three buffalos, and compares with the 1995 annual per capita GDP (a measure of mean annual income) in Lao PDR of US\$ 363 (UNDP, 1998). Major seizures of pangolins are all believed destined for export, primarily to Viet Nam and speculatively thence to China (Duckworth *in litt.*, 1999 and see below).

Myanmar Live pangolins and scales are reportedly brought to Yangon (Rangoon) and Mandalay from where they are said to be exported to the Chinese border city of Shweli through the Myanmar border town of Musae. There is also reportedly trade into Thailand through the border town of Tachilek. Pangolins are sold for ca US\$ 50 each in Yangon and ca US\$ 65 in Musae, while one kg of scales is reportedly worth around US\$ 21 and one scale can sell for around RMB 20 per scale (US\$2) on the Myanmar/China border. Pangolins are reportedly also popularly used by the Burmese in traditional medicines (U Tin Than, WWF Thailand, *in litt.*, to TRAFFIC Southeast Asia, February 1999). Trade is likely to be in both *Manis javanica* and *M. pentadactyla* (U Tin Than, WWF Thailand, *in litt.*, to TRAFFIC International, March 1999).

Taiwan Previous extensive use of pangolins in Taiwan, both native and imported, is discussed in detail in the account for this species in WCMC and IUCN/SSC (1992).

Manis pentadactyla is reported to be under pressure from habitat destruction, especially by insecticide spraying (Chao Jung-Tai, 1989; Taiwan Forestry Research Institute *in litt.*, 1992).

Thailand Records indicate that *Manis pentadactyla* occurs only marginally in Thailand (see 'Distribution and Population' above). Most, if not all, use in Thailand of native pangolins is likely to involve *M. javanica* (see relevant account). Indications are that pangolins are imported from Myanmar into Thailand (U Tin Than, WWF Thailand, *in litt.*, March 1999).

INTERNATIONAL TRADE

Virtually all trade in *Manis pentadactyla* recorded in CITES annual reports for the period 1991-1996 took place in 1991 and 1992. The vast majority was in derivatives from China exported to a wide range of countries. Units are given in cartons or boxes or are unspecified. It is impossible to estimate quantities involved in any meaningful way, particularly as the largest number involved is 30000 derivatives of unspecified unit (exported from China to Hong Kong in 1992). As well as this there has been a small trade in live animals (16 in total), bodies (7) and shoes (245) and somewhat more trade in skins. The latter were all imported by Mexico which in 1991 reported import of 5000 skins from the Republic of Korea and 1000 kg of skins from Hong Kong, both with declared origin Indonesia (where the species is not native but *Manis javanica* is); in 1992 Mexico reported importing 5000 skins plus 1000 kg of skins from Viet Nam and 50 skins from the USA with declared origin Indonesia.

Myanmar As noted in the previous section, there is reportedly cross-border trade in pangolins (presumably both this and *Manis javanica*) from Myanmar into Thailand and China. Trade to the latter is substantiated by records of seizures of small numbers of pangolins and small amounts of scales on the Chinese side of the Sino-Burmese border in 1994-1995 (Wang and Li, 1998).

Republic of Korea The Korean Pharmaceutical Traders Association (KPTA) (1993-1998), whose data are more complete than those of the Korean Customs Service (TRAFFIC East Asia *in litt.*, 1999), indicate the import of some 55 mt of pangolin scales (unspecified species) in 1993 and 2 mt in 1994. Of the 1993 imports, 28 mt were from China, 15.5 mt from Viet Nam and 10.6 mt from Indonesia; the 1994 import was from Viet Nam. Both *Manis javanica* and *M. pentadactyla* are present in Viet Nam while only the former is present in Indonesia and probably only the latter in China (which does, however, evidently import a very large proportion of its pangolin product from countries where both species are present). Using the figure in Harrison and Loh (1965) of 1.5 kg of scales per pangolin (for *Manis javanica* in Borneo), then the total import of 57 mt would represent just under 40,000 animals. Using the figure of 3-4 pangolins per kg of scale provided by TRAFFIC India (*in litt.*, to TRAFFIC International, 1999 – see above) for *Manis pentadactyla* in north-east India, then the number of animals would be five to seven times this.

No import has been recorded either by the KPTA or the Customs Service since 1994 (TRAFFIC East Asia, *in litt.*, 1999). Korea became a Party to CITES in 1993, but did not report the 1993 or 1994 imports. The exports from China and Indonesia were unrecorded in these countries' respective annual reports, despite both being Parties to CITES at the time.

Wholesale import value for scales in 1993 and 1994 were US\$ 15-16 per kg (KPTA, 1993-1998); in 1999 wholesale prices were reportedly US\$ 111 per kg, retail prices US\$ 117 per kg (TRAFFIC East Asia, *in litt.*, 1999).

Viet Nam Compton and Le Hai Quang (1998) estimated that, conservatively, at least 400 pangolins were smuggled from Viet Nam to China by land border crossings each week. They were typically seen in cargoes of 50-100 animals. The species involved have not been identified (Compton *in litt.*, 1999); they may be expected to comprise both *Manis javanica* and *M. pentadactyla*.

Gross exports of *Manis pentadactyla*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	total	average
BOD		CA	0	1	0	0	0	0	1	0.2
BOD		DE	2	0	0	0	0	0	2	0.3
BOD		HK	0	1	0	0	0	0	1	0.2
BOD		VN	0	0	0	2	0	0	2	0.3
BOD		XX	1	0	0	0	0	0	1	0.2
DER		CA	0	0	0	0	41	0	41	6.8
DER		CN	0	30000	0	0	0	0	30000	5000.0
DER	BOX	CN	0	2030	0	0	0	0	2030	338.3
DER	CAR	CN	2598	1002	0	0	0	0	3600	600.0
DER	KG	CN	0	0	0	0	0	6	6	1.0
LIV		CN	12	0	0	0	0	4	16	2.7
SHO		MX	0	197	48	0	0	0	245	40.8
SKI		KR	5000	0	0	0	0	0	5000	833.3
SKI		US	0	50	0	0	0	0	50	8.3
SKI		VN	0	5000	0	0	0	0	5000	833.3
SKI	KG	HK	1000	0	0	0	0	0	1000	166.7
SKI	KG	VN	0	1000	0	0	0	0	1000	166.7

CONSERVATION MEASURES

Bangladesh All pangolins are legally protected (Bangladesh CITES MA, 1986).

Cambodia No information.

China *Manis pentadactyla* is listed as a Class II protected species in *China's Wild Animal Protection Law* (1989). Catching or hunting of wildlife under Class II protection requires a special licence. The sale and purchase of wildlife under special state protection or the products thereof is prohibited. As a CITES Appendix II-listed species, the export and import must be approved by the CITES Management Authority (CITES MA of China, 1995a).

Manis pentadactyla is listed as a Class II protected species in the *Regulations on the Conservation and Management of Wild Resources of Medicinal Plants and Animals* (1987). Class II protected species are classified as important medicinal species with a reduced habitat and depleted resources. Hunting, collection and purchase of Class II protected species requires a permit issued by the Chinese medicine management authority, and the wild animal and plant management authorities. The hunting and collection of Class II protected species is not allowed in protected areas or during the seasons when it is forbidden to hunt/collect that species. Export of Class II protected species is allowed according to the export limit set by the authorised departments under the State Administration of Traditional Medicine and the State Council and only with an export permit granted by the authorised departments of the State Administration of Traditional Medicine and the State Council (State Council, PRC, 1987).

Guo *et al.* (1997) note that enforcement of both the above acts appears to be lacking. Despite the fact that the 1987 Regulations are often displayed in the medicinal markets, species afforded protection by these regulations are still available and openly displayed in the markets. Lack of coordination between different departments concerned with enforcement of legislation and regulations is considered by the wild animal authorities as a major problem (Guo, *et al.*, 1997).

An official letter (No. 133) issued by the Ministry of Forestry (now State Forestry Administration) details the correct procedures for the export of medicines containing wild animals. Export of medicines containing wild animals must be carried out in accordance with the *Wild Animal Protection Law* (1989) and CITES. Export of medicines containing animal parts as detailed in the list attached with the notice (which includes 31 listed medicines containing pangolin scales) are prohibited. Documentation issued by the CITES MA must be submitted to customs for approval of export (CITES MA of China, 1995b).

An official notice (No. 48) from the CITES Management Authority and Chief of Customs provides reference for the procedures for export of products made from wild animals. The import, export and re-export of products, including materia medica and products thereof, as detailed in the attached list (which includes pangolin scales) require a CITES export permit or certificate required under the *Wild Animal Protection Law* (1989) before approval to import, export and/or re-export may be granted by customs (CITES MA of China, 1997).

There is no centralised database for the collection of pangolin seizure data in China. Thus not all seizure data are available and those that have been obtained do not reflect the actual level of pangolins in illegal trade through China. Analysis of the Guangxi wildlife authorities' seizure data by Li *et al.* (1996) showed that in Guangxi Province pangolins were among the most frequently confiscated species. From January to October 1991, Guangxi wildlife authorities confiscated around 2700 pangolins (mostly Chinese Pangolins). Official documentation (1990 - 1994) maintained by the local forestry bureaux in Guangxi and Guangdong and analysed by Li *et al.* (1996) revealed that confiscations of wildlife, including pangolins, decreased each year. This was believed more likely to reflect the decline of natural populations or the effort of trade control by local wildlife authorities rather than a decline in demand, as prices for these species reportedly continued to increase (Li *et al.*, 1996). Wang and Li (1998) record the confiscation at the Sino-Burmese border during 1994 and 1995 of small numbers of pangolins (14) and small amounts of pangolin scale (35 kg) apparently originating in Myanmar. Small quantities of *Manis pentadactyla* and *M. javanica* have been seized in Hong Kong during the period 1991-1998 (Agriculture and Fisheries Department of the Hong Kong SAR Government, *in litt.*, to TRAFFIC East Asia, 1999).

India *Manis crassicaudata* and *M. pentadactyla* are totally protected, being included in Schedule I of the Wildlife Protection Act 1972 (Gasky and Hemley, 1991). Chapter 15 of the *Export and Import Policy*, notified under Section 5 of the *Foreign Trade (Development and Regulation) Act*, 1992, prohibits the export of all forms of wildlife including their parts and products.

Lao PDR. The country is not a party to CITES. The legal status of pangolins in Lao PDR is unclear, as a result of internal contradictions in Lao laws applicable to wildlife and wildlife trading. However, Provincial and District Agricultural and Forestry Offices have been confiscating large numbers of pangolins, and so there is evidently a perceived legal basis for doing so. No harvesting or trading management programmes are in place, other than ad hoc confiscation of sacks of pangolins (often mixed with freshwater turtles). A number of measures are being formulated, and some are being undertaken. These include: stepping up of border patrols; declaration of protected areas and initiation of management within them; recognition that pangolins are under major threat and in need of a high priority in conservation activities; upgrading national wildlife laws; public education and awareness (Duckworth, *in litt.*, 1999).

Macao Between 1991 and 1996, some 100 *Manis pentadactyla*, reportedly destined for human consumption, were seized in the Municipality of Macao. Countries of origin were China and Viet Nam (Marçal *in litt.*, to TRAFFIC East Asia, March 1999).

Myanmar (Burma) The country is not a Party to CITES. In accordance with the *Protection of Wildlife, Wild Plant and Conservation of Natural Areas Act 15(A)*, no pangolin may be caught in the wild, kept, sold or exported.

Nepal Hunting of *Manis crassicaudata* and *M. pentadactyla* is prohibited (Gaski and Hemley, 1991).

Taiwan All *Manis* spp. have been protected since August 1990 under the 1989 Wildlife Conservation Law. International and domestic trade, as well as hunting, are now prohibited. During the period 1991-1998, one seizure of pangolin scales (1176 kg originating in Hong Kong) was made (Council of Agriculture, 1998).

Thailand All *Manis* spp. are classified as Protected Wild Animals under the 1992 Wild Animals Reservation and Protection Act B.E. 2535. (TRAFFIC Southeast Asia *in litt.*, 1999).

CAPTIVE BREEDING

Pangolins are difficult to maintain and are rarely kept in captivity (Wilson, 1994). However, captive birth of *M. pentadactyla* has been reported (Masui, 1967).

Guo *et al.* (1997) reported that 50 *Manis pentadactyla* were kept in a farm in an unspecified province in China. However, information from the Chinese CITES Management Authority indicates that there are no registered captive breeding facilities for pangolins in China and that reports of captive breeding of pangolins are likely to refer to individuals taken from the wild (TRAFFIC East Asia *in litt.*, 1999).

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Manis temminckii Smuts, 1832

South African Pangolin
Pangolin de Cabo
Pangolin de Temminck

Order: PHOLIDOTA

Family: MANIDAE

SUMMARY

One of four African pangolin species, a solitary, terrestrial animal inhabiting savannah and woodland in Southern and Eastern Africa. Generally sparsely distributed and classified as 'lower risk (near threatened)' by IUCN. Subject to widespread exploitation for bushmeat and traditional medicine and known to feature in informal cross-border trade in some areas. Listed in Appendix I of CITES until 1995, when it was transferred to Appendix II. No trade has been recorded in CITES annual reports for the period 1991-1996.

The species is recommended under Decision 10.79 for inclusion in category d (iii).

DISTRIBUTION & POPULATION

Widespread in Southern and Eastern Africa as far north as Chad and Sudan, although the limits of the northern part of its range are poorly defined. Generally sparsely distributed. Classified as 'lower risk (near threatened)' by IUCN.

Angola Recorded by Hill and Carter (1941).

Botswana Noted by Skinner and Smithers (1990) as widespread but more frequently encountered in northern and eastern parts with only a few scattered records in the more arid central and southern areas.

Central African Republic Malbrant (1952) cites a record from Ouanda Djallé in the extreme north-east. He thought it likely to be fairly widely distributed in the northern part of the country.

Chad Malbrant (1952) cites several records from the southern part of the country, noting that these represented a considerable westward extension of the northern part of the range as known at that time.

Ethiopia Recently confirmed in the lower Omo Basin, south-west Ethiopia (Schloeder and Jacobs, 1996).

Kenya Reported by Kingdon (1971) as widespread in Kenya although apparently absent from the north-east.

Malawi Noted by Ansell and Dowsett (1988) as probably occurring throughout.

Mozambique Records mapped by Smithers and Lobão Tello (1976) are chiefly in the southern half of the country, with one sight record in Zambézia District. They thought the species likely to be more widely distributed than this, although noted that it appeared to be sparse throughout its range.

Namibia Reported to occur widely in the country, other than in the south and the coastal desert (Skinner and Smithers, 1990). Population densities are reportedly very low at least in part probably because of the marginal quality of the habitat owing to aridity (Griffin, 1999; Lindeque *in litt.*, 1999). Its provisional conservation status is "Vulnerable" (Griffin, 1999).

Rwanda No information; included in a list of range states in Skinner and Smithers (1990).

South Africa Recorded from northern Cape Province, western, northern and eastern parts of the Transvaal, central and southern parts of Orange Free State and northeastern Natal (Smithers and Skinner, 1990). Described variously as very rare (Anon., 1978) and vulnerable (Smithers, 1986). However, in one survey of a 100 sq. km area in the north-western sector of the Sabi Sand Game Reserve (Mpumalanga Province, South Africa) 26 pangolins were recorded over a period of 30 months, indicating a relatively high density (Swart, 1996). It is therefore thought that pangolins may be more numerous than previously thought; however this is unlikely to be the case outside protected areas where densities are expected to be low (Swart, 1996).

Sudan Recorded from the southern part of the country (Malbrant, 1952).

Tanzania Recorded by Kingdon as widespread (1971).

Uganda Noted by Kingdon (1971) as widespread in northern and eastern parts of the country; apparently absent west of Lake Victoria from the Ugalla-Moyovosi Rivers to the Victoria Nile. The commonest pangolin [of three or four species occurring in the country] but 'nowhere really plentiful' (Bere, 1962).

Zambia Ansell (1978) noted that known records were confined to southern and eastern areas, and reported that the species was not at all uncommon in the Lusaka District and the Southern Province.

Zimbabwe Reported by Skinner and Smithers (1990) to occur widely and to be not uncommon in parts of Mashonaland in the vicinity of Harare.

[Democratic Republic of Congo Not known to occur.]

[Somalia Its occurrence was doubted by Funaioli and Simonetta (1966).]

HABITAT AND ECOLOGY

A solitary and terrestrial species that feeds exclusively on a wide range of ant and termite species, inhabiting savannah and woodlands, usually in areas with annual rainfall of 250-1400 mm, and recorded to altitudes of at least 1700 m. Reportedly avoids forests and areas of high rainfall (where it is replaced by *M. gigantea*), swamps, deserts and semi-deserts (Heath, 1992; Skinner and Smithers, 1990).

A study carried out at the Sengwa Wildlife Research Institute in north-west Zimbabwe showed that ten individuals (3 adult females, 3 adult males, 3 sub- or young adults and one newly weaned young) collectively occupied a home range of 65 sq. km (Heath *in litt.*, 1999; Heath and Coulson, 1997a). A study in South Africa found that males occupy an area of approximately 1,800 ha, while females occupy a much smaller area of about 340 ha (Swart, 1996).

The adult sex ratio appears to be roughly 1:1. Females give birth to one young per year after an estimated gestation period of 140 days (Heath, 1992 and *in litt.*, 1999; Van Ee, 1978). There is no information on the percentage of females pregnant each year (Heath *in litt.*, 1999).

Manis temminckii is reported to live in burrows dug by Aardvarks *Orycteropus afer* or Springhaas *Pedetes capensis* (Heath, 1992). Swart (1996) found individuals to be active for about four hours per night, mainly between 20h00 and 24h00. Adults emerged from their underground dens between 19h00 and 22h00, although this can vary considerably. Subadults were often active during daylight hours and in the evening emerged from their dens earlier than adults. When foraging, individuals generally did not venture further than 500 m from their den, and then returned to that den or another close by (Swart, 1996).

THREATS TO SURVIVAL AND DOMESTIC USE

Heath (*in litt.* 1999) notes that the species is sparsely distributed, shows high fidelity to its home range and may be adversely affected by drought. When the species is in poor condition it appears to spend more time foraging and is thus easier to collect. Heath (*in litt.*, 1999) notes that from these factors combined the species may be regarded as susceptible to overexploitation. The impact of habitat alteration, particularly through conversion to cropland, is unknown (Heath *in litt.*, 1999).

Pangolins are susceptible to certain pesticides, in particular those containing gamma-BHC (benzenehexachloride); death from very small quantities has been documented within 24 hours (Swart, 1996; Van Ee, 1978). This substance has been used in the past to control locusts in South Africa and it is likely that *M. temminckii* populations are much reduced in areas where this has occurred (Swart, 1996). Use of pesticides for termite control is also likely to lead to reduced availability of food and ingestion of poisoned insects (Anderson and Willis, 1991). Electric fences have also been documented as a threat to pangolins (Swart, 1996).

Use of pangolin products, mainly for traditional medicine, is widespread throughout Africa (Brautigam *et al.*, 1994; Marshall, 1998). Uses range from treating physical ailments such as heart conditions, nosebleeds and rheumatism, to addressing psychosociological and supernatural problems. Uses include rain making, bringing good luck, and warding off evil spirits. While blood is used in some treatments, scales are the predominant product used in traditional medicine (Brautigam *et al.*, 1994; Coulson, 1985; de Villiers, 1987; Marshall, 1998; Swart, 1996). Use and desirability of pangolin meat seems to vary through the species's range (see comments under individual countries below).

Kenya An informal survey of medicinal markets in Nairobi undertaken in 1998 revealed that pangolins and pangolin products were unavailable. It was learned that pangolin scales are used for witchcraft, and that people are generally unwilling to discuss use of pangolins due to fear of being branded as a witch. Despite reluctance to admit knowledge of pangolins and their uses, it was found that pangolin products are extremely rare in Nairobi markets and are likely to be naturally rare in the country (TRAFFIC East/Southern Africa, 1998).

Malawi Recorded by Marshall (1998) as one of a dozen or so animal species in high demand amongst practitioners of traditional medicine, the scales being regarded as a good luck charm. The species was considered as of conservation concern owing to this demand.

Mozambique Used by practitioners of traditional medicine; reportedly subject to occasional scarcity (Marshall, 1998).

Namibia Use of *M. temminckii* has been the focus of considerable concern in Namibia. The following account is drawn from Marshall (1998). The scales are reportedly used by practitioners of traditional medicine to treat heart conditions, and the blood and internal organs used as a remedy for psycho-sociological problems. In the first half of the 1990s live pangolins could reportedly command very high prices, with figures as high as N\$ 10 000 (US\$ 2400) quoted. Subsequent investigations revealed actual prices of between N\$ 200 and N\$ 9000 (US\$44-2000) for a live adult. Law enforcement officers reported that only three pangolins were reported in trade in 1990, compared with a total of some 200 between 1991 and 1995. This apparent sudden increase in trade was rumoured to be to supply demand from staff of foreign embassies and illegal traders, although it seems that there never any substantial evidence to support this. In 1995 it was surmised by the Namibian Protected Resources Unit that pangolin dealers were having difficulty selling specimens, and none were seized by authorities or recorded in trade in 1996 or 1997. It is thought that the trade may have been based on rumours of extreme value circulating amongst dealers and trappers, who then obtained animals on a speculative basis. There reportedly remains a demand for pangolins amongst practitioners of traditional medicine, although their use is not condoned by the Namibia Eagle Traditional Healers Association, a representative body of traditional healers recognized by the Namibian Government (Lindeque *in litt.* 1999). The meat is apparently also sought after (Anon., 1997).

South Africa Consumption of meat is apparently limited as it is considered too fatty (Anon., 1997). In 1993 pangolin scales, presumably of *M. temminckii*, were offered for sale in Pretoria for ca. US\$ 15 each (Brautigam *et al.*, 1994).

Zimbabwe The meat is apparently sought after (Anon., 1997). It has been reported (Anon., 1989) that it is customary in Zimbabwe to catch pangolins when they are seen and present them to superiors. Thus pangolins may be presented to local chiefs to be eaten, to a spirit medium or n'anga, or to a rainmaker (Coulson, 1985).

INTERNATIONAL TRADE

The species was listed in Appendix I of CITES from 1975 to 1995, when it was transferred to Appendix II. No trade in this species has been included in CITES annual reports for the period 1991-1996. National use is discussed above. In 1994 it was reported that there was some evidence of specimens being exported (illegally) from Namibia to Zimbabwe, Zambia and South Africa (and conversely of some regional export trade from Zimbabwe (IUCN Species Survival Commission and TRAFFIC Network, 1994), as well as some import from southern Angola into northern Namibia (Brautigam *et al.*; Griffin, 1999; Marshall, 1998). As noted above, trade in pangolins within Namibia seems to have been a short-lived phenomenon of the early to mid-1990s, with no seizures reported in 1996 or 1997.

A limited export of products or pieces of *Manis javanica* leather from South Africa (in which *Manis temminckii* is the only resident pangolin species) has been recorded in 1995 and 1996, comprising 39 pairs of shoes in 1995, 136 leather items in 1996, plus a total of some 22 kg of skins and skin pieces. However, in 1995 South Africa also recorded the import of some 575 skins of *Manis javanica* from the USA, with declared origin Lao PDR (slightly higher figures for export to South Africa were recorded by the USA in 1994). It would seem therefore that these skins were processed by the South African leather goods industry and a proportion of the resulting products re-exported. There is thus no reason to believe that these reports represent misidentification or misreporting.

CONSERVATION MEASURES

The species is legally protected in a number of countries within its range (Brautigam *et al.*, 1994; Heath, 1992, and see below), although such protection is unlikely to be fully enforced. It is known or suspected to occur in a number of protected areas throughout its range (Heath, 1992; Heath *in litt.*, 1999).

Botswana The pangolin is listed as a Protected Game Animal in the Sixth Schedule of the Wildlife Conservation and National Parks Act, 1992. No person shall hunt or capture this animal without a permit issued by the Director under the terms and conditions outlined in sections 39 (Permits) and 40 (General Provisions with Regard to Hunting) of the Act. No export, re-export or import is permitted without a permit granted by the Director.

Kenya *Manis temminckii*, and all members of the family Manidae, are protected under the Third Schedule (L.N. 126/1981) of the Kenya Wildlife (Conservation and Management) Act (Revised edition 1985, CAP 376). No hunting, trading, or use of any kind is allowed. Killing of the animal as a "problem animal" is also prohibited. All problem animal culling of species protected by this schedule must be carried out by the Kenya Wildlife Service.

Malawi *Manis temminckii* is protected under the National Parks and Wildlife Act (No. 11 of 1992) National Parks and Wildlife (Protected Species) (Declaration) Order, 1994 Part II Protected Species of Wild Animals.

Pangolins may not be hunted or killed without the express permission of the responsible Minister of Tourism and Wildlife. Offences related to import, export or re-export of specimens of protected or listed species including pangolins, their parts and derivatives, may incur a fine of K10,000 (US\$233 at current exchange rate), or not be less than the value of the specimens involved, and imprisonment for a term of 5 years.

Pangolin specimens are, however, commonly found in trade in the medicinals trade throughout Malawi, clearly highlighting a weakness in enforcement (TRAFFIC East/Southern Africa, *in litt.*, 1999).

Mozambique Hunting Regulations Portaria 117/78 of 1978 state that *Manis temminckii* receives total protection. Possession and domestic/international trade is regulated.

Namibia No collection, hunting or trade of the species is permitted and the Namibian Police's Protected Resources Unit has included it in their list of species, goods and trade under surveillance. *M. temminckii* occurs or is expected to occur in ten protected areas, although only marginally in seven of these (Griffin *in litt.*, 1999). Attempts are under way at present (early 1999) to develop effective translocation projects in Namibia for pangolins that have been confiscated from dealers and trappers

(Heath *in litt*, 1999). Re-introduction efforts to date have been largely unsuccessful with pangolins generally dying within two weeks of release (Heath *in litt.*, 1999; Heath and Coulson, 1997b).

South Africa Legally protected (IUCN Species Survival Commission and TRAFFIC Network, 1994).

Sudan *Preservation of Wild Animals Act, 1935 (as amended)*, the genus *Manis* is in Schedule 2 of the Act which means that they can only be taken with a special license. Export prohibited except with an export permit issued by the Minister. Sale of any scheduled animal or animal part is prohibited except as expressly declared by regulations under the Act.

Swaziland *Manis temminckii* is classified as Royal Game under *The Game (Amendment) Order, 1993* of Swaziland. This is an amendment of *The Game Act, 51 of 1953*. This means that a permit is required for hunting, capture and sale of any pangolin meat or young. The export of any game meat from Swaziland is prohibited except with a licence issued with the approval of the District Commission.

Tanzania Under the Wildlife Conservation Act, 1974, the capture of live animals requires a valid *Trapper's Card* and a *Permit to Capture Animals* (fees vary depending on animal). There are also specific requirements for holding grounds. Pangolins are classified as National Game and are prohibited from being hunted, killed, captured, or wounded unless with the written permission of the Director. All trophies must be registered with a *Certificate of registration* and every trophy dealer must carry a valid *Trophy Dealer's License* (class 16 for other live or stuffed animals). Exports of trophies must be accompanied with a *Trophy Export Certificate*. Tanzania has not had an export quota for pangolins during the years 1995 to 1998 and has not issued CITES export permits during 1997 and 1998.

Zambia: The family Manidae is noted as protected under the National Parks & Wildlife (Licenses and Fees) Regulations, 1971, which establishes a fee for the export of trophies therefrom.

Zimbabwe Listed as a Specially Protected Animal under the 1975 Parks and Wildlife Act (Heath, 1992).

CAPTIVE BREEDING

Has been maintained and bred in captivity (in South Africa) (Van Ee, 1978). Pangolins in general are difficult to maintain and are rarely kept (Wilson, 1994).

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Manis tetradactyla Linnaeus, 1766

Long-tailed Pangolin
Pangolín de cola larga
Pangolin tetradactyle

Order: PHOLIDOTA

Family: MANIDAE

SUMMARY

One of four African pangolin species, inhabiting forested areas of central and western Africa. Rarely recorded and evidently the most arboreal and probably most narrowly distributed African pangolin, although the limits of its range are poorly defined. Probably fairly widely exploited for food and traditional medicine, although far less frequently recorded in local use than *M. temminckii* or *M. tricuspis*. Only one specimen has been recorded in trade by CITES in the period 1991-1996.

The species is recommended under Decision 10.79 for inclusion in category d (iii).

DISTRIBUTION AND POPULATION

Apparently widespread in forested regions in central and western Africa (see below). Limits of range are poorly defined as there is possibility of confusion with *Manis tricuspis*. Reports indicate that it is more narrowly distributed than the latter, and seems generally much less abundant. It certainly appears to be the least frequently recorded of all four African pangolin species. However it is also by far the most strictly arboreal and would be expected to be less likely to be captured or recorded. It is conceivable that it is less rare than the paucity of records suggests.

Angola Reported from as far south as Namibe (Moçâmedes) (Meester and Setzer, 1971-77).

Benin No records located; occurrence possible (Happold, 1987).

Burundi No records located; occurrence possible.

Cameroon Recorded by Jeannin from the southern part of the country (1936).

Central African Republic: No definite records located, although it may be expected to occur in forested areas in the southern part of the country..

Congo Present and thought likely to be widespread (Dowsett and Dowsett-Lemaire, 1991; Malbrant and Maclatchy, 1949).

Democratic Republic of Congo: Rahm (1966) noted that most locality records were from the north and north-east, but considered it likely to be distributed throughout the forested part of the country. In the Bunyakini region in eastern Zaire it appeared rarer than *Manis tricuspis*.

Côte d'Ivoire Recorded by Rahm (1955). Reported from Tai National Park (FGU-Kronberg, 1979).

Equatorial Guinea Recorded by Cabrera (1929), who noted it as absent from Bioko (Fernando Póo).

Gabon Recorded by Pagès as widespread (1970).

Gambia Occurrence possible, though no definite records located (Happold, 1987).

Ghana Present (Happold, 1987).

Guinea No definite records located, though may be expected to occur (Happold, 1987).

Liberia Recorded by Strong (1930) and Kuhn (1965).

Nigeria Happold (1987) notes one record from 1939; its continued presence in the country remains unverified.

Rwanda No records located; occurrence possible.

Senegal Cabrera (1929) and Allen (1939) cite Senegal as the westernmost limit of the species's range.

Sierra Leone Recorded as present by Davies (1987), with a definite record from Mamunta-Mayoso.

Togo No definite records located; may occur (Happold, 1987).

Uganda: Recorded by Bere (1962), and Meester and Setzer (1971-77) note a report of it from Bwamba in the eastern part of the Ituri Forest in the country.

[Burkina Faso Of doubtful occurrence (Roure, 1968).]

[Mali Occurrence unlikely (Happold, 1987)]

[Sudan: Recorded by Hillman (1982) although its presence in the country seems unlikely on biogeographic grounds.]

HABITAT AND ECOLOGY

Found in forests, apparently often in swamp forests. Reportedly the most arboreal of the African pangolins. Generally nocturnal, although is more often active during the day than the other species. Feeds on tree-ants and termites, consuming 150-200 g each day. Generally solitary. Individuals apparently have well-defined home ranges. Breeding can reportedly occur at any time of year, and females generally mate only 9 to 16 days after giving birth to their previous young. Usually a single young is born, in a bare hollow in a tree, following a gestation period of 4.5-5 months. The young is well developed at birth, weighing 100-150 g, and measuring 30-35 cm in total length. It is weaned at three months and becomes independent at around nine months, reaching full adult size at around 15 months (Pagès, E, 1970 and 1972).

THREATS TO SURVIVAL AND DOMESTIC USE

Reputed to be more dependent on mature forests than *M. tricuspis* (Pagès, 1970), and therefore may be expected to be more affected by deforestation, although concrete data are lacking.

As discussed in the accounts for the other species, pangolins are widely exploited in Africa, both for meat and for medicinal purposes. There is very little information specifically on exploitation of *M. tetradactyla*. Where specific identification has been made of pangolins being used (e.g. Marshall, 1998; Sodeinde and Adepipe, 1994; Steel, 1994), they have generally been reported as *M. tricuspis* or *M. temminckii*, and less frequently as *M. gigantea*. Of studies of bushmeat trade in west and central Africa summarised by Brautigam *et al.* (1994), only one, around Kisangani in Zaire (Colyn *et al.*, 1987), specifically reported *M. tetradactyla*. Three individuals of this species were identified out of a total of just over 100 pangolins observed for sale in rural areas during 1980-84. This seems likely to reflect the greater rarity of this species. However, its apparently highly arboreal nature would seem likely to offer it some protection against hunting when compared to the terrestrial *M. gigantea* and *M. temminckii* and the semi-terrestrial *M. tricuspis*.

INTERNATIONAL TRADE

Only one specimen of this species has been recorded in international trade in the period 1991-1996 according to CITES annual reports. This was export of a body from Belgium (a non-range state) to the USA in 1995.

As with other African pangolin species, there may be expected to be some unrecorded and informal cross-border regional trade for bushmeat and medicines.

CONSERVATION MEASURES

The species may be expected to occur in a number of protected areas throughout its range, although there appear to be very few actual records (see, e.g. IUCN, 1987). The species may be expected to be

covered by general wildlife legislation in many countries within its range, but appears to be rarely mentioned by name (see, e.g. IUCN, 1986). Legally protected in Nigeria (Sodeinde and Adedipe, 1994).

CAPTIVE BREEDING

Pangolins are difficult to maintain in captivity and are rarely kept in zoos or other collections. *M. tetradactyla* has been kept on occasion, but is not known to have bred in captivity (Wilson, 1994).

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Manis tricuspis Rafinesque, 1821

Tree Pangolin
Pangolin à écailles tricuspidés

Order: PHOLIDOTA

Family: MANIDAE

SUMMARY

One of four African pangolin species, inhabiting a range of habitats in western and central Africa. A semi-arboreal species and apparently the least specialised African pangolin. Evidently subject to widespread, and in some areas at least, intensive exploitation for bushmeat and traditional medicine, in areas where it occurs being by far the most abundant pangolin offered for sale. Some of this trade is probably of an informal cross-border nature. Included in Appendix III of CITES by Ghana until 1995, when it was transferred to Appendix II. Trade recorded by CITES in the period 1991-1996 is extremely limited, consisting of some 70 live animals exported by Togo. This is clearly negligible compared with local use.

The species is recommended under Decision 10.79 for inclusion in category d (iii).

DISTRIBUTION & POPULATION

Widespread in western and central Africa, apparently as far east as western Kenya and as far south as north-west Zambia, although limits of the range appear to be poorly defined. In most places where this and at least one other pangolin species occur together it is regarded as the most abundant (see e.g. Happold, 1987; Malbrant and Maclatchy, 1949; Meester and Setzer, 1971; Pagès, 1975). Various reported to be declining (see Brautigam *et al.*, 1994), although this appears to be based almost invariably on anecdotal evidence.

Angola Recorded by Hill and Carter (1941).

Benin Reported by Sayer and Green (1984) as observed in the Monts Kouffé protected forest in 1978, with dead specimens occasionally sold for meat in markets in central Benin. They thought it probably quite common and widespread in the Guinea savannah zone.

Burkina Faso Of doubtful occurrence (Roure, 1968).

Burundi The country lies within the range of the species, but no definite records have been located.

Cameroon Recorded by Jeannin (1936).

Central African Republic Noted by Malbrant (1952) as occurring in the centre and south.

Congo Noted as widespread by Malbrant and Maclatchy (1949).

Democratic Republic of Congo Noted by Rahm (1966) as reported from the whole of the forested part of the country and in some of the gallery forests in the south. In the east of the country it was fairly frequently recorded and apparently commoner than *M. tetradactyla*.

Côte d'Ivoire Recorded by Rahm (1955).

Equatorial Guinea Recorded by Cabrera (1929) as present both in Río Muni and on Bioko (Fernando Póo).

Gabon Recorded by Pagès (1975) as by some way the commonest of the three pangolin species found in the country, the other two being *M. tetradactyla* and *M. gigantea*.

Gambia Cabrera (1929) gave Gambia as the westward limit of the species's range. According to Happold (1987) its presence there has not been verified.

Ghana Reported in 1993 as believed to be declining (Brautigam *et al.*, 1994).

Guinea Recorded by Roche as widespread (1971). Reported in 1993 as believed to be declining (Bräutigam *et al.*, 1994).

Guinea-Bissau According to Happold (1987) presence not verified, although may be expected to occur.

Kenya Recorded by Fleetwood (1962) from the Kaimosa region in the west.

Liberia Recorded by Strong (1930) and Kuhn (1965) as widespread.

Mozambique Listed by Meester and Setzer (1971) but rejected by Smithers and Tello (1976).

Nigeria Happold (1987) cites a number of locality records, primarily in the south and observed that the species was probably not uncommon in suitable undisturbed forest habitats (Happold, 1987); reported in 1994 as in decline in the south-west (Sodeinde and Adepipe, 1994).

Rwanda Reported in 1993 as close to extinction (Bräutigam *et al.*, 1994).

Senegal Recorded as present (Happold, 1987).

Sierra Leone Recorded as present (Davies, 1987).

Sudan Recorded by Hillman (1982).

Tanzania Kingdon (1971) reports the species from Mabira, in north-west Tanzania west of Lake Victoria.

Togo Recorded as present by Happold (1987).

Uganda Reported in the 1960s as abundant in Chagwe (Meester and Setzer, 1971).

Zambia Recorded from northwestern Mwinilunga District, near where the borders of Angola, Democratic Republic of Congo and Zambia meet (Ansell, 1978). The possibility that it occurs in north-eastern Zambia near the Malawian border, raised by Ansell (1978) has subsequently been rejected (Ansell, 1982).

HABITAT AND ECOLOGY

A semi-arboreal, generally nocturnal and apparently largely solitary species that feeds on a wide range of ants and termites. Noted by Pagès (1970, 1972, 1975) as the least specialised of the African pangolins. Recorded mainly from forested areas, though stated by Kingdon (1971) to be absent from montane forests. Sodeinde and Adedipe (1994) note that *M. tricuspis* was frequently reported to them as caught on abandoned or little-used oil palm trees in secondary growth. Kingdon (1971) also reports that the species was found "in some numbers" when secondary forest was cleared for plantations in Mabira in Tanzania. These observations suggest that the species can adapt to at least some degree of habitat modification. Indeed Kingdon (1971) averred that the species was commonest in secondary growth where termites and ants abounded.

Although *Manis tricuspis* is often reported to be arboreal, Pagès (1975) in her study in Gabon found it to feed largely on the ground. However, its sleeping sites or refuges were usually hollows in trees, generally 10-15 m above the ground. Occasionally individuals sheltered in shallow burrows in the ground, often in termite mounds. There are indications that males are territorial, with large mutually exclusive home ranges (20-30 ha in Gabon). Each male's home range overlaps with that of several females. Female home ranges appeared to be considerably smaller, with some overlap between them (Pagès, 1975).

Gestation period is estimated at around 6 months. The single young is weaned at 3-4 months and adult size is not reached until 15 months. Pagès (1972) found the species to breed year-round in Gabon and also seldom found adult females that were not pregnant, suggesting that females generally conceived very soon after giving birth.

THREATS TO SURVIVAL AND DOMESTIC USE

As discussed above, it is possible that habitat conversion does not pose a major threat to the species. As with other African pangolins, *M. tricuspis* is evidently subject to widespread and, in some areas at least, intensive exploitation for bushmeat and traditional medicine. In areas where it occurs it is generally by far the most abundant pangolin offered for sale. Thus, in Gabon, Steel (1994) recorded a total of 120 individuals on sale in four markets during 1993, compared with only 23 *M. gigantea*, while Sodeinde and Aderogba (1994) note that this was the only species caught and offered for sale with any regularity in their study area in Ogun State, south-west Nigeria.

In areas where quantitative studies have been made (e.g. Democratic Republic of the Congo in the early 1980s (Colyn *et al.*, 1987) and Gabon in 1993 (Steel, 1994)), pangolins appear to form only a small percentage of total bushmeat on sale (5% or less) although demand, as reflected in price, appears often to be relatively high. Thus in markets in Libreville, Gabon, in 1993 pangolin meat was one of the most expensive forms of bushmeat selling at CFA 1154 (ca. US\$ 4) per kg. Similarly, Anadu *et al.* (1988) found pangolin to be the second-most expensive form of bushmeat on sale in Nigerian markets, selling in 1982 for 7.55 Niara (ca. US\$ 4.7) per kg.

INTERNATIONAL TRADE

In 1995 *Manis tricuspis* was included in Appendix II, having previously been included in Appendix III by Ghana. Trade recorded in CITES annual reports for the years 1995-1996 consists of 30 live animals exported from Togo, 20 to Japan and 10 to the USA, probably primarily for the zoo trade. Very limited trade (5 live animals exported from Togo and one skin exported from Cameroon) was reported in the period 1991-1994. Overall trade in the species reported by CITES for this period is evidently negligible in comparison to local use, discussed above, and whatever informal cross-border trade, for bushmeat or medicinals, may take place within Africa.

Gross exports of *Manis tricuspis*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	total	average
LIV		TG	5	0	0	0	0	30	35	5.8
SKI		CM	0	1	0	0	0	0	1	0.2

The only other trade in African *Manis* spp., or in trade originating in Africa of *Manis* spp., declared in CITES annual reports for the period 1991-1996 consists of: a single specimen of *Manis tetradactyla* exported from Belgium (a non-range state) to the USA in 1995; a small amount of export from South Africa declared as *Manis javanica*, discussed under that species and under *M. temminckii*; and a single leather item of an unspecified *Manis* species imported by the USA from Nigeria in 1994. Additionally, in 1990, Republic of Korea customs statistics noted import of 100 kg of pangolin scales from Madagascar (a non-range state for any pangolin) (Brautigam *et al.*, 1994 and see account for *Manis javanica*). This report is likely to have been in error. There is thus no evidence of any recent large scale formalised international trade in *Manis* species from Africa.

CONSERVATION MEASURES

The species is legally protected in a number of countries within its range (Brautigam *et al.*, 1994), although such protection is unlikely to be fully enforced. It is known or suspected to occur in a number of protected areas throughout its range (e.g. Tai National Park and Mount Nimba Integral Natural Reserve in Côte d'Ivoire, Sukusuku Forest Reserve, Ghana; Mount Nimba Integral Natural Reserve in Guinea (IUCN, 1987)).

Kenya All members of the family Manidae are protected under the Third Schedule (L.N. 126/1981) of the Kenya Wildlife (Conservation and Management) Act (Revised edition 1985, CAP 376). No hunting, trading, or use of any kind is allowed. Killing of the animal as a "problem animal" is also prohibited. All problem animal culling of species protected by this schedule must be carried out by the Kenya Wildlife Service.

Nigeria Legally protected (Sodeinde and Adedipe, 1994).

Tanzania Under the Wildlife Conservation Act, 1974, the capture of live animals requires a valid *Trapper's Card* and a *Permit to Capture Animals* (fees vary depending on animal). There are also specific requirements for holding grounds. Pangolins are classified as National Game and are prohibited from being hunted, killed, captured, or wounded unless with the written permission of the Director. All trophies must be registered with a *Certificate of registration* and every trophy dealer must carry a valid *Trophy Dealer's License* (class 16 for other live or stuffed animals). Exports of trophies must be accompanied with a *Trophy Export Certificate*. Tanzania has not had an export quota for pangolins during the years 1995 to 1998 and has not issued CITES export permits during 1997 and 1998.

Zambia The family Manidae is noted as protected under the National Parks & Wildlife (Licenses and Fees) Regulations, 1971, which establishes a fee for the export of trophies therefrom.

CAPTIVE BREEDING

Has been kept in captivity, though apparently rarely. Pangolins in general are difficult to keep and very rarely bred in captivity (Wilson, 1994). No records of captive breeding of *M. tricuspis* have been located.

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Pecari tajacu (Linnaeus, 1758)

Collared Peccary
Pécari de collar
Pecari à collier

Order: ARTIODACTYLA

Family: SUIDAE

SUMMARY

A widely distributed, Central and South American species. There are few population data but it is abundant in some areas and not considered seriously threatened nationally over much of its range. Reported international trade during the period 1991-1996 was mainly in skins or skin products and amounted to about 400,000 animals. The range States that exported significant quantities of skins were Argentina, Bolivia, Peru and the USA. The exports from the USA were reported as re-exports originating in Argentina. Exports from Argentina were apparently the result of clearing registered stocks; all trade was banned in 1988 but exports continued until at least 1996, apparently from these stocks. Exports from Peru averaged about 45,000 per year with a peak in 1996 when the price paid for skins was briefly increased. The trade in skins is almost entirely a by-product of the harvest of animals for meat. Sustainable harvest levels have been calculated for Peru and the international trade in skins generally falls within these levels. There is no evidence that international trade is affecting populations of the species.

The species is recommended under Decision 10.79 for inclusion in category d (iii).

DISTRIBUTION AND POPULATION

Bodmer and Sowls (1993) gave the distribution as: Arizona, New Mexico and Texas in the USA, a large part of Mexico and Central America, the entire Amazon basin, the Pacific coastal forest of Colombia, Ecuador and Peru, the llanos and forest of Venezuela, the Guianas and Suriname, the Pantanal and Mato Grosso of Brazil and the Chaco of Paraguay, Bolivia and northern Argentina. They noted that some of the larger islands near the mainland of the Caribbean, such as Cozumel (to Mexico) and Trinidad and Tobago, also have populations of the species, and an introduced population has been established on Cuba. The USA population was excluded from CITES Appendix II when the species was listed on 22 October 1987 (Anon., 1987), and the Mexican population was removed from Appendix II with effect from 18 September 1997.

The Collared Peccary is not considered seriously threatened nationally over much of its extensive range and is not listed as globally threatened in IUCN (1996).

Bodmer and Sowls (1993) noted that the species was the most abundant and least threatened of the three extant peccary species. Recorded population densities varied with habitat and rainfall (and also with degree of exploitation – see below). Measured densities ranged from fewer than 1 per km² (in the Brazilian Pantanal) to nearly 11 per km² in the Tucson Mountains in Arizona (Bodmer and Sowls, 1993). WCMC (1992) referred to estimates indicating that there were some 7.5 million km² of forest habitat within the overall range of the species, most of which served at least as potential habitat. In addition, there were large areas of open forest or non-forest habitats (pantanal, llanos) which might also support the species. Even if the species were only present in, say, one fifth of its potential habitat and at the lower end of the range of population densities quoted above, the overall population would be well in excess of one million.

There has been no modern taxonomic revision of the species. Grubb and Groves (1993) listed 14 subspecies, divided informally into three groups:

- i). *Pecari t. tajacu* (Brazil);
- ii). *P. t. patira* (Guianas); *P. t. torvus* (Colombia); *P. t. crusnigrum* (Panama); *P. t. bangsi* (Panama and Colombia); *P. t. niger* (Ecuador), all of which are likely to be indistinguishable from *P. t. patira* (Hershkovitz, 1963);
- iii) *P. t. angulatus* (Texas, USA); *P. t. nanus*, *P. t. humeralis*, *P. t. yucatanensis*, *P. t. crassus*, *P. t. nelsoni* (all Mexico); *P. t. nigrescens* (Honduras).

Argentina Found in the north, as far south as Entre Rios Province (Bodmer and Sowls, 1993). Noted by Barbarán (1999b) as declining in the semi-arid Chaco region of Rivadavia Dept, Salta Province, where it was confined to areas with good forest cover.

Belize Evidently widespread (Bodmer and Sowls, 1993).

Bolivia Evidently widespread (Bodmer and Sowls, 1993).

Brazil Evidently widespread (Bodmer and Sowls, 1993).

Colombia Evidently widespread (Bodmer and Sowls, 1993).

Costa Rica Evidently widespread (Bodmer and Sowls, 1993). Especially easy to find at Santa Rosa and Palo Verde National Parks (Reid, 1997).

Cuba Introduced (Bodmer and Sowls, 1993).

Ecuador Evidently widespread to an altitude of around 1,500 m (Bodmer and Sowls, 1993).

El Salvador Reported extinct (Bodmer and Sowls, 1993)

French Guiana Evidently widespread (Bodmer and Sowls, 1993).

Guatemala Evidently widespread (Bodmer and Sowls, 1993).

Guyana Evidently widespread (Bodmer and Sowls, 1993).

Honduras Evidently widespread (Bodmer and Sowls, 1993).

Nicaragua Evidently widespread (Bodmer and Sowls, 1993).

Panama Evidently widespread (Bodmer and Sowls, 1993). Especially easy to find on Barro Colorado Island, and in Soberania and Darién National Parks (Reid, 1997).

Paraguay Evidently widespread (Bodmer and Sowls, 1993). Hill *et al.* (1997), in a study of the impact of hunting on large vertebrates in the Mbaracayu Reserve, found that this species was the eighth most important contributor of meat to the diet of the Ache Indians, and concluded that its population in the reserve was not affected by harvesting.

Peru Evidently widespread to an altitude of around 1,500 m (Bodmer and Sowls, 1993). Occurs throughout the Amazonian forests and the dry Pacific forests of the north-west (Bodmer, 1999). Estimates of population density have been made in several parts of the Peruvian Amazon in an attempt to derive sustainable harvest and pelt export levels. In Loreto, Bodmer *et al.* (1997) used information on habitat types, demography, land uses and hunting pressures to estimate an annual sustainable quota of 26,040 individuals. Anon. (1998) evaluated the population status of peccaries in the Peruvian Amazon and found that hunting levels were highest close to established communities, where peccary densities were sometimes seriously affected and generally below the ideal of 60% of carrying capacity and could, therefore, be considered unsustainable. However, in more remote areas, where hunting pressure was low, they stated that the harvest was definitely sustainable.

Suriname Evidently widespread (Bodmer and Sowls, 1993).

Trinidad and Tobago Present (Bodmer and Sowls, 1993).

Uruguay Reported extinct (Bodmer and Sowls, 1993).

Venezuela Evidently widespread (Bodmer and Sowls, 1993). Eisenberg *et al.* (1979) gave density estimates in two localities as 8.5 to 12.0 and 1.9 to 4.0 per km², respectively.

HABITAT AND ECOLOGY

Unless otherwise indicated, the account in this section has drawn from Bodmer and Sowls (1993). A highly adaptable species, recorded in habitats ranging from lowland tropical moist forest with annual rainfall in excess of 2,000 mm to desert areas with annual rainfall of less than 250 mm and midday temperatures of up to 45°C; in the northern part of its range the species can maintain viable populations in areas where light snow cover is occasionally present in winter. In tropical forest areas, at least where the species is sympatric with *Tayassu pecari*, it appears to use primarily moist *terra firma* forests rather than floodplain forests or wet *terra firma* forests (Bodmer, 1991 in N. L. Gottdenker *in litt.* to the IUCN/SSC Wildlife Trade Programme, 1999).

Principally, though by no means exclusively, vegetarian, the diet consists of a wide range of roots, tubers, fruits, nuts and the green parts of plants. In tropical forests where the species has been studied, palm fruits appear to be the most important food, supplemented with invertebrate animal material. In deserts the diet is apparently dominated by the cladophylls (pads) of *Opuntia* cacti. A social species, living in herds, varying from fewer than six to over 30. Measured home ranges of groups vary greatly (from 24 ha to 800 ha) with a mean of around 150 ha. In some areas, such as the north-eastern Peruvian Amazon, the species breeds throughout the year. In others, for example in French Guiana, where there are pronounced differences between wet and dry seasons, peccaries give birth primarily in the wet season (N. L. Gottdenker *in litt.* to IUCN/SSC Wildlife Trade Programme, 1999). The gestation period is 142-145 days and the normal litter size is two. The young are highly precocial and are weaned at around six weeks.

THREATS TO SURVIVAL AND DOMESTIC USE

The species may be adversely affected by habitat loss and fragmentation, particularly where cover is completely removed, as in conversion of forest to open pasture. However, the very wide range of the species and its adaptability indicate that habitat loss is not a major threat at present. Indeed some agricultural practices may reportedly actually increase population densities. More important are the effects of habitat fragmentation in making populations more vulnerable to hunting, and of agricultural encroachment increasing likelihood of conflict between agriculturists and peccaries, as the latter may cause considerable damage to crops (Bodmer and Sowls, 1993).

The species is extensively hunted for its meat and hide. N. L. Gottdenker (*in litt.* to the IUCN/SSC Wildlife Trade Programme, 1999) noted that it is a very important source of protein, and in some cases income from the sale of meat and hides, for many indigenous and non-indigenous peoples in the Neotropics. In a review of studies of hunting by rural inhabitants of Amazonia, the two species of peccaries together ranked first in terms of biomass hunted in 12 out of 13 cases (Gottdenker, 1996, in N. L. Gottdenker *in litt.* to the IUCN/SSC Wildlife Trade Programme, 1999). Robinson and Redford (1991) calculated an average density over the range of this species as 11.83 per km², and a maximum production value, based on average density and other factors, of 12.03 per km².

Argentina Peccaries, mainly *Pecari tajacu* (the most abundant species) are widely used in the Province of Salta as a source of food. Meat is reportedly primarily eaten by subsistence trappers, with the commercial market largely limited to local communities, small towns near areas where peccaries are hunted and the occasional visitor (F. R. Barbarán *in litt.* to the IUCN/SSC Wildlife Trade Programme, 1999). In 1997-98, hunters in Rivadavia Dept, Salta Province, received around US\$ 2 per kg of meat. The main incentive to hunt appeared to be to obtain meat, with hides being a secondary product. In 1997 trappers were reportedly paid around US\$ 2.5-3 per hide. Cured hides were sold to boot-makers in the city of Salta for US\$ 45 per m² and boots were sold at a retail price of US\$ 120-150 per pair (Barbarán, 1997 and 1999b). F. R. Barbarán (*in litt.* to the IUCN/SSC Wildlife Trade Programme, 1999) considered that hides were largely used by the domestic market in Argentina, although as discussed below, several thousands were reported exported annually during the period 1991-1996. He expressed concern that, because of the lack of stock verification, traders may have declared many more skins than they were holding, and then continued to add skins from newly killed animals to their stock. The price in 1997 was reportedly US\$ 6 per square foot (ca. US\$ 65 per m²) (Barbarán, 1997).

Peru Peccaries continue to be widely hunted for their meat and pelts, although, in general, the pelts are only a by-product of the hunting for meat. Bodmer (1999) calculated a sustainable harvest level for the country of 43,226 and noted that the average number of skins exported during the period 1991-1995 was well below this; however, the 1996 export figure of 66,605 was well above this level. He noted that, during 1996-1997, the price paid to hunters for skins of this species increased from around US\$2-3 per pelt to around US\$7-9, but the price returned to the lower level in 1998. He thought it likely that the increased number of pelts in 1996 was due to stored pelts being sold when the price was high; however, he warned that, if the increase reflected an increase in actual harvests, paying a higher price to hunters would constitute a threat to the species. Bodmer (1999) noted that peccary pelts from the Peruvian Amazon are usually of poor quality and can not be used for large leather products such as jackets, but only for small products such as gloves, shoes, belts and watchstraps.

INTERNATIONAL TRADE

The overwhelming proportion of trade in *Pecari tajacu* as recorded in CITES Annual Reports for the period 1991-1996 was in skins, skin pieces or products (garments, shoes, watch-straps). There was negligible international trade in other body parts or live animals.

Of range States, only Argentina, Bolivia, Peru and the USA exported significant quantities of skins with the vast majority (nearly 99%) originating in Argentina and Peru (Mexico recorded the export of one skin in 1991). The recorded exports from the USA of just under 14,000 skins in 1991-1994 and just under 15,000 skin pieces during the period 1991-1993 were recorded as re-exports of skins originating in Argentina. Excluding these, the total recorded exports of skins from range States in the period 1991-1996 amounted to just over 390,000. Of these, Argentina accounted for 30% and Peru the remainder, excepting the import recorded by Germany of just over 6,000 skins from Bolivia in 1995.

The species was listed in Appendix II in 1987 and during the three years 1988-1990 the pattern of trade was different from that recorded subsequently. The exports from Argentina fell from 212,553 in 1988 to only 65,673 in 1990 as the stocks registered in 1987 were cleared. Bolivia exported 9,300 skins in 1988, 4,200 in 1989 and none in 1990. Exports from Peru were relatively stable, averaging 46,643 during the three years.

Argentina

Argentinian exports declined from an annual average of 38,000 skins for the years 1991 and 1992 to an annual average of 10,000 for the period 1993-1996. From 1972 to 1979, Argentina recorded the export of just over 312,000 peccary skins (species not specified), an average of 39,000 skins a year (Ojeda and Mares, 1982).

Bolivia

In 1995, Germany reported the import of 6,053 skins from Bolivia. As explained under Conservation Measures, no commercial hunting of this species is allowed in Bolivia; however, they may have been

tanned skins derived from subsistence trade.

Peru

The reported exports from Peru, which averaged about 45,000 skins annually, showed a decrease from over 40,000 a year during 1991-1993 to 28,000 in 1994, but then increased to a peak of nearly 67,000 in 1996. L. A. Lozano (*in litt.* to WCMC, 1999) provided details of officially registered exports of skins from Peru:- 1993: 62,996, 1994: 32,962, 1995: 36,804, 1996: 71,833; these figures, except that for 1995, are all higher than those reported to CITES. Bodmer (1999) commented that it is possible that a proportion of the trade from Peru reported as *Pecari tajacu* is in fact *Tayassu pecari*. He observed that studies of hunting indicate that more of the latter than the former are harvested in Peru. However, skins of the former are valued more highly in the international leather trade and there may therefore be some incentive to misdeclare exports (or imports). He noted that total recorded exports from Peru for *P. tajacu* for the period 1991-1995 are lower than recorded imports of this species for the same period, while for *T. pecari* the situation is reversed. He suggested that, in some cases, skins exported as *T. pecari* may be declared on import as *P. tajacu*; however, this is unlikely to be the case as the importing countries base their reports on the export permits received.

Peccary skins have been exported in quantity from Peru since at least 1920. At this time the Amazon rubber boom collapsed and rural inhabitants began to look for other sources of income. One of these was the export of wild animal pelts to Europe and North America (Bodmer, 1999). These were sold through a system of professional pelt hunters and traders from 1920 until 1973. During this period *Tayassu pecari* and *Pecari tajacu* were the most frequently hunted animals. Between 1946 and 1973 nearly 3 million skins of *P. tajacu* were exported in total. Overall, exports steadily rose from 1946 until the early 1970s when they began to fall. Peccaries were harvested by all types of hunters because they were a common source of meat, although the value of the pelts was relatively low (ca US\$ 1 per skin). In 1970 the average hunter would reportedly kill around 18 *P. tajacu* annually. By this period hunters reported that peccaries were harder to find and export levels, particularly of *P. tajacu* dropped, apparently as a result of overhunting, and hence depleted populations. Figures in Bodmer (1999) indicate that export of *P. tajacu* increased in each year from 1973 (80,250 exported) until 1977 (142,297 exported) (although numbers of *T. pecari* reported in trade decreased each year from 1974 to 1977, perhaps indicating increasing numbers of the latter were being exported as the former). Exports of *P. tajacu* skins then declined until 1982, when some 15,600 were exported. Data for 1983-1986 were not available; exports for 1987-1989 were around 30,000-33,000 annually.

Gross exports of *Pecari tajacu*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996 total	average
BEL		DE	0	0	0	0	9	0	1.5
BEL		FR	0	1	0	0	0	0	0.2
BEL		IT	0	0	0	180	155	415	125.0
BEL	PAI	IT	0	0	0	242	0	0	40.3
BOD		CA	0	0	1	0	0	0	0.2
BOD		GB	2	0	0	0	0	0	0.3
BOD		KE	2	0	0	0	0	0	0.3
BOD		PA	4	0	0	0	0	0	0.7
BOD		VN	0	0	2	0	0	0	0.3
GAR		AR	0	0	0	1069	0	0	178.2
GAR		DE	0	130	0	44	60	0	39.0
GAR		ES	0	360	183	0	0	267	135.0
GAR		FR	70	33	0	0	98	40	40.2
GAR		GB	0	141	0	1298	717	0	359.3
GAR		HU	2758	622	1164	3384	19482	15440	7141.7
GAR		IT	0	4297	0	536	194	0	837.8
GAR		PE	0	0	0	0	210	0	35.0
GAR		PT	148	0	0	519	302	0	161.5
GAR	PAI	DE	4018	5567	2302	3469	1167	0	2753.8
GAR	PAI	ES	0	6	0	270	146	398	136.7
GAR	PAI	HU	18396	15817	12897	17865	0	4008	11497.2

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996 total	average	
GAR	PAI	IT	0	0	0	281	429	1071	1781	296.8
GAR	PAI	PE	0	210	0	0	536	876	1622	270.3
GAR	PAI	PT	239	226	0	0	0	0	465	77.5
HAN		DE	5958	220	0	0	24	0	6202	1033.7
HAN		IT	2	0	0	0	0	0	2	0.3
LIV		AR	0	0	0	0	3	2	5	0.8
LIV		BR	0	3	0	0	0	0	3	0.5
LIV		DE	6	6	2	3	0	1	18	3.0
LIV		GB	0	0	1	0	0	0	1	0.2
LIV		HU	0	2	0	0	2	0	4	0.7
LIV		PL	0	0	0	5	0	0	5	0.8
LPS		CH	0	0	0	0	1	0	1	0.2
LPS		DE	0	0	0	2155	822	0	2977	496.2
LPS		ES	0	0	0	270	0	0	270	45.0
LPS		FR	0	0	0	45	0	0	45	7.5
LPS		IT	0	0	0	6033	2768	0	8801	1466.8
LPS		JP	0	0	0	0	5	0	5	0.8
LPS		PE	0	0	0	0	0	1082	1082	180.3
LPS		PT	0	0	0	0	0	65	65	10.8
LPS	KG	IT	0	0	0	0	259	0	259	43.2
LPS	PAI	CH	0	0	0	16	0	0	16	2.7
LPS	PAI	DE	0	0	0	0	610	0	610	101.7
LPS	PAI	ES	0	0	0	0	48	0	48	8.0
LPS	PAI	IT	0	0	0	0	9871	0	9871	1645.2
LPS	PAI	PE	0	0	0	0	0	181	181	30.2
PLA		AR	0	0	2000	0	0	0	2000	333.3
SHO		AR	0	0	0	578	0	44	622	103.7
SHO		CH	1397	225	0	6	0	0	1628	271.3
SHO		DE	1185	527	0	27	0	0	1739	289.8
SHO		ES	0	0	160	99	72	305	636	106.0
SHO		FR	25	0	3	0	0	0	28	4.7
SHO		HK	0	0	0	0	44	0	44	7.3
SHO		IT	4482	3483	619	23732	35116	33918	101350	16891.7
SHO		PE	0	0	0	2354	544	111	3009	501.5
SHO		PH	0	0	0	0	0	43	43	7.2
SHO		US	6	0	0	0	0	0	6	1.0
SKI		AR	34922	42146	11135	12017	6171	10975	117366	19561.0
SKI		BO	0	0	0	0	6053	0	6053	1008.8
SKI		CA	0	0	1	0	0	0	1	0.2
SKI		DE	15205	17201	7386	8682	9945	153	58572	9762.0
SKI		FR	18	15	0	0	0	150	183	30.5
SKI		GB	20	0	0	0	0	0	20	3.3
SKI		IT	5065	1922	4759	5327	7481	10665	35219	5869.8
SKI		JP	0	0	0	940	0	0	940	156.7
SKI		MX	1	0	0	0	0	0	1	0.2
SKI		PE	47073	40198	48277	27922	36804	66605	266879	44479.8
SKI		US	7637	860	2966	2436	0	0	13899	2316.5
SKI	KG	IT	293020	49418	0	0	0	0	342438	57073.0
SKI	KG	PE	645	0	59	515	0	0	1219	203.2
SKI	MTR	IT	0	39	0	0	0	0	39	6.5
SKI	PAI	DE	0	0	0	44	0	0	44	7.3
SKI	PAI	PE	0	0	2002	0	0	0	2002	333.7
SKI	SQF	IT	134260	10445	415	0	0	0	145120	24186.7
SKI	SQM	IT	21	970	374	2425	86	0	3876	646.0
SKI	SQM	US	0	0	0	0	2891	0	2891	481.8
SKO		AR	0	0	0	79	0	0	79	13.2
SKO		AT	114	0	0	0	0	0	114	19.0
SKO		CA	0	219	15363	370	316	222	16490	2748.3

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996 total	average	
SKO		DE	9221	5022	2013	0	0	0	16256	2709.3
SKO		ES	0	0	227	0	0	0	227	37.8
SKO		FR	400	300	376	2	48	100	1226	204.3
SKO		GB	202	216	523	0	6	0	947	157.8
SKO		IT	1636	93919	3294	177	348	976	100350	16725.0
SKO		PE	0	0	0	0	30	0	30	5.0
SKO		PT	64	0	0	0	0	0	64	10.7
SKO		US	0	497	0	0	0	1	498	83.0
SKO	PAI	DE	0	1410	0	0	0	0	1410	235.0
SKO	PAI	ES	0	186	0	0	0	0	186	31.0
SKO	PAI	FR	193	109	0	0	0	0	302	50.3
SKO	PAI	GB	414	0	0	0	0	0	414	69.0
SKO	PAI	HU	983	0	5223	0	0	0	6206	1034.3
SKO	PAI	IT	1040	0	0	0	0	0	1040	173.3
SKP		AR	0	0	0	4	0	0	4	0.7
SKP		DE	0	0	738	1576	1249	3208	6771	1128.5
SKP		FR	1	0	0	0	0	0	1	0.2
SKP		GB	0	0	1203	0	0	0	1203	200.5
SKP		IT	28	0	0	0	84	157	269	44.8
SKP		PE	3606	0	0	9458	330	716	14110	2351.7
SKP		US	9308	1363	4073	0	0	0	14744	2457.3
SKP	KG	IT	0	0	0	0	0	190	190	31.7
SKP	KG	PE	885	434	789	0	0	4514	6622	1103.7
SKP	PAI	DE	0	0	0	500	0	0	500	83.3
SKP	PAI	IT	0	179	0	0	0	0	179	29.8
SKP	SQF	PE	0	408	0	0	0	0	408	68.0
SKP	SQM	CA	0	0	0	0	0	590	590	98.3
SKP	SQM	IT	0	0	0	48	0	0	48	8.0
SKS		AT	0	30	0	0	0	0	30	5.0
SKS		IT	0	9	0	0	40	0	49	8.2
SKS		PE	0	2621	0	0	0	0	2621	436.8
SKS	KG	IT	0	0	0	9	249	0	258	43.0
SKS	KG	PE	36	10	0	0	0	0	46	7.7
SKU		AR	0	0	0	0	0	2	2	0.3
SKU		MX	0	0	0	0	1	0	1	0.2
SKU		PY	0	0	2	0	0	0	2	0.3
SKU		US	0	2	0	0	0	0	2	0.3
SPE		PY	0	0	2	0	0	0	2	0.3
SPE		US	0	0	0	1	0	0	1	0.2
SPE	KG	PE	0	0	0	0	40	0	40	6.7
TEE		ID	0	0	0	0	0	1	1	0.2
TEE		MX	0	0	0	8	1	0	9	1.5
TRO		AR	1	1	0	0	0	14	16	2.7
TRO		CA	0	0	0	0	0	3	3	0.5
TRO		MX	5	0	3	0	0	9	17	2.8
TRO		US	0	2	1	0	0	0	3	0.5
UNS		IT	0	18	0	20	0	6	44	7.3
UNS	PAI	IT	0	40	0	1042	340	159	1581	263.5
WAL	PAI	DE	0	0	0	252	0	0	252	42.0
WAT		AR	0	0	0	2	0	0	2	0.3
WAT		AT	64	1	0	0	17	0	82	13.7
WAT		CA	277	45	20	365	46	0	753	125.5
WAT		CH	1	47	2	0	2	0	52	8.7
WAT		DE	127	107	0	0	0	0	234	39.0
WAT		FR	4750	0	0	0	0	160	4910	818.3
WAT		IT	10	0	0	0	0	0	10	1.7
WAT		MU	4481	0	0	0	0	0	4481	746.8
WAT	PAI	DE	0	0	0	0	4	0	4	0.7

In the above table the unshaded rows are those relating to trade from range states of the species.

CONSERVATION MEASURES

Argentina: All trade, including export and inter-provincial transit, in peccary products was prohibited in 1988 via Resolution 793/88 of the Secretaría de Agricultura, Granadería y Pesca (Porini, 1993). However, Bodmer *et al.* (1993) reported that commercial hide hunting was prohibited in 1987, but continued in practice until at least 1990, when the peccary market was closed. The declaration of all skins held in stock was required, but no verification was carried out. Since then, only these registered stocks have been allowed for export (Porini, 1993).

Bolivia: Categorised as Vulnerable nationally, and protected under Decreto de Veda General Indefinida (D.S. 22641) of 1990, which restricts hunting to the subsistence trade in leather (Ergueta and de Morales, 1996). Resolución Ministerial No. 14316-74 states that wild animal hides, including those of peccaries, intended for export must be tanned in Bolivia (Fuller *et al.*, 1987). No export quotas were set from 1995 to 1999.

Brazil: The export of all wildlife was prohibited in 1967. Lei 5197 of IBDF (1967) prohibited all capture of forest animals for commercialisation of skins and regulated sport hunting (Anon., 1987).

Colombia: Ban on trade in wild animals. Resolución 849 (1973) forbids commercial hunting and trading of peccaries and their derivatives (Anon., 1987).

Ecuador: All commercial exports of wildlife were banned in January 1983 (CITES Notification No. 306).

Guatemala: The export of wild animals that are not listed as endangered species, but are listed as protected species, may be allowed if the requirements established by the Management Authority are followed (Article 49 of the Law on Protected Areas, 1989) (CITES Notification No. 708).

Panama: No export permits were issued from 1991 to 1999 (D. M. Botello, *in litt.* to CITES Secretariat, 1999).

Paraguay: Paraguay banned trade in wildlife and wildlife products on 4 November 1975 under Presidential Decree No. 18.796 (Fuller *et al.*, 1987).

Peru: In 1974 Peru enacted legislation prohibiting commercial hunting but permitting export of peccary pelts if they originated from subsistence hunters (Bodmer, 1999); however, commercial hunting continued in practice until at least 1990 (Bodmer *et al.*, 1993). Subsistence hunters have continued to harvest peccaries and sell the hides, many of which are apparently destined for export. An export quota of 30,000 tanned skins was set for 1995 and 1996 (CITES Notification Nos. 874 and 916), and this was increased to 71,550 tanned skins in 1997 (CITES Notification No. 994). No export quotas were communicated to the Secretariat for 1998 or 1999 (CITES Notification Nos. 1998/36 and 1999/21). Anon. (1998) evaluated the population status of peccaries in the Peruvian Amazon to determine if the current levels of exploitation were sustainable and calculated appropriate commercial quotas for the export of skins for each of four Departments. The results yielded a recommended national export quota of 39,390 individuals of this species. Bodmer (1999) calculated a conservative sustainable harvest level for the same area of 43,226 animals.

Venezuela: Categorised as being at 'Minor Risk' nationally and no specific conservation measures have been undertaken apparently (Rodríguez and Rojas-Suárez, 1995). The Ley de Protección de la Fauna Silvestre of 1970 regulates hunting. The species is included on the official list of Game species by Resolution MAC-RNR-5-276 which prohibits commercial exploitation (Anon., 1987).

CAPTIVE BREEDING

Bodmer and Sowls (1993) recommended the establishment of a properly structured captive-breeding programme. They pointed out that, although the species is relatively well represented in captivity, the overwhelming majority of captive animals are of unknown or mixed origin. Very few collections have apparently made any attempt to ascertain, let alone ensure, the genetic integrity of recognised subspecies and regional populations.

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Saiga tatarica Linnaeus 1766

Saiga
Antelope saiga

Order: ARTIODACTYLA

Family: BOVIDAE

SUMMARY

A nomadic herding antelope that inhabits the open dry steppe grasslands and semi-arid deserts of Central Asia. The majority of *S. tatarica* are found in Kazakhstan (~80%). The species is globally categorised by IUCN as 'Vulnerable'. The biology and habitat requirements of *S. tatarica* are well-known and populations are relatively well-monitored. The species is reported to have a high rate of reproduction and recruitment and populations fluctuate naturally in response to climatic conditions. In the mid-1990s the population was considered vulnerable to sudden crashes in numbers owing to the low proportion of adult males. Overall populations of *S. tatarica* have since declined; this is generally attributed to the selective poaching of males for their horns, which are valued in traditional Asian medicines. Available information suggests that there is an extensive unreported and illegal international trade in horn; the actual scale is difficult to assess as detection and reporting appear to be at a relatively low level.

The species is recommended under Decision 10.79 for inclusion in category d) i.

DISTRIBUTION AND POPULATION

Inhabits the steppes and semi-desert of Central Asia. *Saiga tatarica* is globally categorised as 'Vulnerable' (IUCN, 1996). From information provided in recent references it appears that between 1991 and 1994, the global population of *S. tatarica* was relatively stable at just under one million animals, the majority of which were in Kazakhstan (~810,000-825,000) (Bekenov *et al.*, 1998; Lushchekina *et al.* 1999; Sokolov and Zhirnov, 1998). Recent information from A.B. Bekenov and Iu.A. Grachev (*in litt.* to IUCN Species Survival Commission, 1999) suggests that the population of *S. tatarica* in Kazakhstan had fallen by spring 1998 to around 570,000 animals (a decline of ~30%).

Two subspecies are recognised:

S. t. mongolica – endemic to Mongolia. Globally categorised as 'Endangered' (IUCN, 1996).

S. t. tatarica – widely distributed in steppe and semi-desert from west of the Volga River eastwards through much of Kazakhstan. Globally categorised as 'Vulnerable' (IUCN, 1996).

China: formerly distributed in Xinjiang in Bole, western Yumin, eastern and south-eastern Junggar. Not found in China since the 1960s (Zhang, 1997).

Kazakhstan: approximately 80% of remaining *S. t. tatarica* are now found in Kazakhstan (Bekenov *et al.*, 1998). The total Kazakhstan population in the spring of 1998 has been estimated at around 570,000 animals, though the number of animals in both the Betpak-dala and Ustiurt populations require further confirmation (A.B. Bekenov and Iu.A. Grachev *in litt.* to IUCN Species Survival Commission, 1999).

There are three distinct populations:

The Ural population is located in Kazakhstan between the Volga River and the Ural River. A mass mortality of this population occurred in the winter 1995/1996 (estimated population in 1994, from aerial census, was 274,000 [Bekenov *et al.*, 1998]). From vehicle observations this population was estimated in 1998 to number 104,000 animals (A.B. Bekenov and Iu.A. Grachev *in litt.* to IUCN Species Survival Commission, 1999). The lack of recovery since 1996 has been attributed to the allegedly severe poaching of this population (A.B. Bekenov and Iu.A. Grachev *in litt.* to IUCN Species Survival Commission, 1999).

The Ustiurt population east of the Ural River ranges through western Kazakhstan and north-western Uzbekistan; aerial surveys during February 1998 estimated this population to consist of about 246,000 animals (A.B. Bekenov and Iu.A. Grachev *in litt.* to IUCN Species Survival Commission, 1999). The population is considered to be in a healthy condition mostly owing to the low human population of the

area and subsequent low poaching pressure (A.B. Bekenov and Iu.A. Grachev *in litt.* to IUCN Species Survival Commission, 1999).

The Betpak-dala population ranges throughout much of central Kazakhstan, from north of the Aral Sea to south of Lake Balkhash. The population was estimated in 1996 by aerial counts at 248,000 animals (Bekenov *et al.*, 1998); the status count for 1998 was inconclusive as only a third to half of the range was surveyed (A.B. Bekenov and Iu.A. Grachev *in litt.* to IUCN Species Survival Commission, 1999). This population dropped sharply in the unusually snowy winter of 1993/1994 from 510,000 to 282,000; it has apparently remained in a depressed state allegedly due to severe poaching (A.B. Bekenov and Iu.A. Grachev *in litt.* to IUCN Species Survival Commission, 1998; Bekenov *et al.*, 1999).

Mongolia: *S. t. mongolica* is endemic to Mongolia. Two populations exist, one in the Shargyn Gobi and one in Mankhan district. Surveys undertaken by Amgalan and Nyambayer (1998) during November 1998 concluded that virtually all of the remaining *S. t. mongolica* occur within the Shargyn Gobi (~3,000 animals), while in January 1998 very few animals remained in Mankhan district (~40-50) (Shar, 1998). Surveys undertaken by Lushchekina *et al.* (1999) in 1997 have suggested that potential total range is approximately 5,300 km², however differences in habitat suitability were not taken into account. Survey results have confirmed that both numbers of *S. t. mongolica* and its range have been increasing since the early 1980s (Amgalan and Nyambayer, 1998; Lushchekina *et al.*, 1999).

S. t. tatarica is possibly now extinct in north-west Mongolia (Anon. 1994; Lushchekina *et al.*, 1999).

Russian Federation: the Kalmyk population west of the Volga River is considered to be an isolated European group. Between 1991 and 1995 this population has been estimated at approximately 145,000 to 150,000 animals; it has been suggested that this is the optimal population level for the available habitat (Anon., 1994; Sokolov and Zhirnov, 1998). Further details are required on the current status of the Kalmyk population.

Turkmenistan: the Ustiurt population of *S. t. tatarica* (see Kazakhstan) may stray into north-western areas during extreme winters (Bekenov *et al.*, 1998).

Uzbekistan: the Ustiurt population of *S. t. tatarica* (see Kazakhstan) occurs to the west of the Aral Sea during snowy winters, and through much of western Uzbekistan during extreme winters (Bekenov *et al.*, 1998).

HABITAT AND ECOLOGY

S. tatarica is a nomadic herding species that generally inhabits the open dry steppe grasslands and semi-arid deserts of Central Asia. Bekenov *et al.* (1998) described the typical habitat as flat open areas covered with low-growing vegetation, allowing animals to run quickly; areas of broken terrain or dense cover are generally avoided, but animals may stray into these out of necessity. Observations by Lushchekina *et al.* (1999) suggest that *S. t. mongolica* prefers hill slopes to flat lands. The main constraint to winter distribution of *S. t. tatarica* is the depth and density of snow cover (Bekenov *et al.*, 1998). Diet consists mostly of various grasses, herbs and shrubs (Nowak, 1991).

S. t. tatarica are seasonally migratory animals. In the spring months herds move from wintering areas in the south to the dry steppes in the northern part of the range, often travelling several hundred kilometres; in the autumn, herds migrate south to areas of less snow (Chan, *et al.* 1995). Herds range in size from groups of tens or hundreds of animals in summer to several thousand in autumn (Bekenov, *et al.* 1998). Mating occurs in the southern overwintering sites. Males are territorial during the rut and may gather a harem of between 5 and 30 females (Nowak, 1991; Bekenov, *et al.* 1998). In late April groups of several thousand animals move north and congregate in the calving areas (Bekenov, *et al.* 1998). *S. t. mongolica* does not undertake large-scale migrations and the calving period is much later in the year; however, during summer droughts animals are known to migrate from the Shargyn Gobi north-west across the Khuisiin Gobi to the Great Lakes basin (Lushchekina *et al.*, 1999).

S. tatarica has a high rate of reproduction and recruitment. In years with a favourable climate the population can increase by up to 60% in a single year (Chan, *et al.* 1995). The percentage of breeding females in a population is usually not less than 65%; up to 95% of females produce young in their first year, with twin calves being common, resulting in an average litter size of 1.6 young per breeding

female (Chan, *et al.* 1995). Female fertility is known to decrease after four years (Bekenov, *et al.* 1998). The gestation period of *S. tatarica* is reported to be between 139 to 152 days, females usually reach sexual maturity within their first year, males become sexually mature at 19 to 20 months (Nowak, 1991). The sex ratio among young animals is generally close to 1 : 1. Among older animals there are more females than males resulting from higher male mortality during the rut, and selective poaching of males for their horns (only males carry horns) (Bekenov, *et al.*, 1998). Very few animals in a population are more than 3.5 years old, indicating that the population is almost completely renewed after four years (Bekenov, *et al.* 1998). Known maximum longevity in the wild is 10 to 12 years (Nowak, 1991).

THREATS TO SURVIVAL AND DOMESTIC USE

After the recovery of populations from the low levels of the 1920s, *S. t. tatarica* have been hunted and managed primarily for their meat since 1950 (Milner-Gulland *et al.*, 1995). Populations have come under intense poaching pressure in recent years, particularly for the horns of males which are highly valued in traditional Oriental medicine (Chan *et al.*, 1995).

Legal hunting for meat, horns, and other products: the harvest of *S. tatarica* is important to the Kazakhstan national economy. Bekenov, *et al.* (1998) reported that between 1955 and 1993 5,572,000 *S. tatarica* were killed in Kazakhstan, from which 91,000 tonnes of marketable meat was obtained. A male *S. tatarica* carcass will yield on average 21.5 kg of meat, a female will yield 14.5 kg and a calf 6.9 kg (Bekenov, *et al.*, 1998). Skins of *S. tatarica* are used to make box-calf and suede. *S. tatarica* provides a source of cheap meat, raw materials used in the leather and drug (traditional Oriental medicine) industries and hard currency (Bekenov, *et al.*, 1998). Between 1991 and 1996 the annual commercial harvest in Kazakhstan was reduced from 112,000 to 30,000 animals due to concern about the decrease in population growth rate caused by poaching, habitat loss, and inadequate conservation measures (Bekenov, *et al.*, 1998). In 1998 the legal quota was 30,000 animals of the Ustiurt population, 10,000 of the Ural population, no licences were issued for hunting the Betpak-dala population (E.J. Milner-Gulland *in litt.* to IUCN/SSC Wildlife Trade Programme, 1998).

Chan *et al.* (1995) reported that in 1995 Official horn stockpiles totalled 3,500 to 4,000 kg in Kazakhstan and 1,500 kg in Kalmykia. Using the figure in Fadeev and Sludsky (1982) for the weight of a pair of horns processed for export (246 g) the Kazakhstan stockpile would amount to ~15,000 pairs of horn; the Kalmykia stockpile would amount to ~6,000 pairs of horn. It is however unclear whether these stockpiles contained processed or unprocessed horns so these figures represent the maximum number of horns. The Kazakhstan horns were obtained during the 1994 hunting season, while the Kalmykia stock was collected from dead males during the previous four to five years (Chan *et al.*, 1995).

Organised sport (non-commercial) hunting of *S. tatarica* appears to be popular, with trophies exhibited at Russian and international exhibitions (Sokolov and Zhirnov, 1998). This limited hunting may provide economic benefits to local communities.

Use in traditional Oriental medicines: Chan *et al.* (1995) stated that the demand for *S. tatarica* horn has been driven by the relatively recent appearance late last century of the horn as an ingredient in traditional Oriental medicine. Horn is used to reduce "heat" (which may appear as a fever), and to treat "internal wind" often associated with liver problems. In combination with other medicines it is also used to treat convulsions, headache, vertigo and other problems. The use of horn is common in China and wherever Chinese communities are found; it appears that horn is of lesser importance in Korean and Japanese medicine. In conclusion, Chan *et al.* (1995) were unable to determine whether demand for horn has changed over the last decades, but they were able to confirm that demand was high. Surveys, conducted between May and June of 1996 by the Chinese Academy of Science in six Chinese medicine markets in China showed that horns were widely available and amongst the most frequently observed materia medica (Guo, *et al.*, 1997).

Poaching: Sokolov and Zhirnov (1998) reported that illegal hunting of *S. t. tatarica* became extensive after "perestroika" in the late 1980s. The State monopoly on foreign trade was eliminated and customs controls weakened. The profits gained by poaching animals attracted "businessmen" not only from Kalmykia and Kazakhstan but also from regions of the Russian Federation, Cis-Caucasica and Baltic countries. It has been estimated this that poaching caused annual losses of 100,000 individuals, most of

them adult males, in 1989-1990 (Sokolov and Zhirnov, 1998). The high prices paid by "businessmen" for horn stimulated poaching by local people (in 1994 horn was purchased from locals at US\$ 30 per kg). According to Bekenov *et al.* (1998) poaching has now become a social institution; in many towns and villages a proportion of young people poach *S. tatarica* for horn instead of working. Bekenov *et al.* (1998) reported that *S. tatarica* have never received adequate protection from hunters, whereas previously they were shot mainly in autumn and winter for meat, they are now shot all year round for their horns.

Sokolov and Zhirnov (1998) reported that up to 500 cases of poaching have been documented annually in Kalmykia, and that more have remained undetected. According to the State Game Control Agency, about 700 fresh horns were taken from poachers in 1992-1993; while game servicemen found 480 poached animals with horns removed (Sokolov and Zhirnov, 1998).

TRAFFIC Europe-Russia (*in litt.* to TRAFFIC International, 1999a) report that decline in demand for horn in 1995-1996 resulted in reduced poaching of males in Kalmykia. However illegal hunting increased again in 1997-98. The main method of poaching involved hunting animals from motorbikes.

In Kazakhstan animals have been poached extensively over recent years (Sokolov and Zhirnov, 1998). The scale of poaching is difficult to assess as only small numbers of incidents have been detected by State Game Inspections (Bekenov, *et al.* 1998; Sokolov and Zhirnov, 1998). Chan *et al.* (1995) reported that each year about 1,500 cases of poaching are investigated in Kazakhstan and 1,000 to 1,500 kg of horn are confiscated by militia and Customs officers. According to commercial hunting experts, at least as many animals are killed by poachers as are hunted legally (Bekenov, *et al.*, 1998). Illegal hunting by organised groups with high-speed vehicles has been reported (Sokolov and Zhirnov, 1998).

Changes in population dynamics: according to Milner-Gulland *et al.* (1995) populations of *S. tatarica* had remained relatively stable over recent years, probably through the recent reduction in legal hunting (especially of males). However, the selective poaching of adult males for their horns in all four populations leading to a low proportion of males could lead to a sudden crash in *S. tatarica* numbers (Milner-Gulland *et al.*, 1995). Bekenov, *et al.* (1998) reported that the number of sexually mature males in groups of *S. tatarica* has fallen from 2-27% between 1966 and 1980, to 2-18% between 1990 and 1994. The lack of males may influence population dynamics through increased juvenile mortality caused by the lengthening of the parturition period and reduced female fertility caused by a lack of mating opportunities (Milner-Gulland *et al.*, 1995).

Habitat loss: migration routes and suitable habitat for *S. tatarica* have been greatly affected by the construction of irrigation canals, cultivation of new land, settlements, fenced off pastures and other constructions (Bekenov, *et al.*, 1998). Loss of habitat through desertification, caused by a more intensive human use of the area, has been particularly severe in Kalmykia (Milner-Gulland *et al.*, 1995). The Kalmyk population began to decline in the 1980s with the construction of irrigation canals and increased degradation of the steppe habitat by overgrazing of domestic livestock (principally sheep). Only about 20% of the habitat remains (Chan *et al.*, 1995).

Chan *et al.* (1995) reports that the isolated populations of *S. t. mongolica* are under high pressure from intensive cattle farming and other disturbances.

Disease: transmission of infectious and parasitic disease from domestic livestock to *S. tatarica* can lead to considerable levels of mortality (10 to 20% of the population) (Sokolov and Zhirnov, 1998). Females and calves appear to be most affected (Khakhin and Sedov, 1992)

Other factors: the high recruitment rate of *S. tatarica* is much reduced in years of droughts (during spring and summer) or during especially snowy winters. In drought years female fertility is recorded to decrease by between 40 and 60%; the mortality of young antelopes can be as high as 70-80% of the years offspring (Chan, *et al.* 1995). Excessive snow cover (30 cm or more) in the deserts and semi-deserts of Kazakhstan occurs every 10 to 11 years (known as *dzhuts*), and can lead to starvation and mass death, especially of males that have participated in the rut (50 to 70% mortality) (Bekenov, *et al.* 1998; Chan, *et al.* 1995).

INTERNATIONAL TRADE

S. tatarica was listed in Appendix II of CITES in 1995. Consequently, information available from the CITES Trade Database is limited to 1995 and 1996.

Between 1995 and 1996 international trade in *S. tatarica* recorded in CITES Annual Reports was almost wholly in horn and derivatives. There was little trade reported in other products (trophies, live animals, skins, skulls).

Approximately 15,440 kg of horn were recorded in CITES Annual Reports during this period (~11,850 in 1995; ~3,590 in 1996), mostly as re-exports from Hong Kong, Russia or Singapore. Using the figure in Fadeev and Sludsky (1982) for the weight of a pair of horns processed for export (246 g) this would amount to just under 63,000 pairs of horn.

The origin of horn in CITES Annual Reports was mostly unrecorded during 1995, although a large quantity (~4,200 kg, equivalent to ~17,000 pairs of horn) of horn from Kazakhstan was reported as a re-export from Russia to Singapore (this was the only export of horn reported by Russia in 1995). During 1995 much of the horn in trade was reported as imports by Singapore from Hong Kong (~3,600 kg). CITES Annual Reports suggest that much of the horn reported as entering Singapore (~7,800 kg in total, of which 360 kg were declared as pre-Convention) during 1995 may have been re-exported to Japan and Malaysia (~2,100 kg). There were no recorded re-exports of *S. tatarica* in Hong Kong's 1995 CITES Annual Report (Hong Kong's 1995 and 1996 CITES Annual Reports were received by WCMC after the compilation of the comparative tabulations taken from the CITES database; the Gross Export table has been amended).

During 1996 virtually all the horn recorded in trade was reportedly re-exported by Hong Kong to China (and recorded by China); this was unrecorded in Hong Kong's 1996 CITES Annual Report. Most re-exports of horn reported by Hong Kong were to Japan (~1,700 kg); Japan reported the import of only 1,000 kg of horn from Hong Kong in its 1996 CITES Annual Report (Japan's 1996 CITES Annual Reports were received by WCMC after the compilation of the comparative tabulations taken from the CITES database). The origin of horn reported as re-exports by Hong Kong was unrecorded.

Information provided on the import of *S. tatarica* horn into China by Song (1996) revealed a peak in reported trade during 1991 and 1992. After this period the price of horn fell substantially (possibly through a saturation of the market) and imports were much reduced (it is unclear whether prices given are retail or wholesale). Song (1996) records the import of 6,000 kg of horn and horn powder into China during 1996, there is no record of this in China's 1996 CITES Annual Report.

Imports of *S. tatarica* horn into China, 1980 – 1995 (Source: Song, 1996)

Year	Kg	US\$	US\$/kg
1980	3,172	2,214,000	698
1981	-	-	-
1982	3,000	344,700	115
1983	4,500	637,500	142
1984	-	-	-
1985	4,500	1,031,100	229
-	-	-	-
1990	11,300	5,790,000	512
1991	56,000	1,930,000	34
1992	43,000	1,520,000	35
1993	1,000	50,000	50
1994	-	-	-
1995	6,000*	110,000	18

* horn and horn powder

Retail prices for *S. tatarica* horn in medicinal markets surveyed in China in 1996, were in the range RMB 500-750 per kg (US\$ 60-91 per kg) (Guo, *et al.*, 1997). Wholesale prices in 1998 ranged from RMB 751 per kg (US\$ 91 per kg) for first grade horns to RMB 606 per kg (US\$ 73 per kg) for standard horns with bone core still attached (SATCM, 1998).

During 1998 approximately 500 kg of *S. tatarica* horn were recorded as imports (a re-export from Russia of Kazakhstan origin) by Hong Kong; re-exports of ~1,290 kg of horn (mostly pre-Convention stocks of unknown origin re-exported to the USA; and 500 kg of horn recorded as an import re-exported to Singapore) were reported for the same year (Agriculture and Fisheries Department of Hong Kong SAR Government *in litt.* to TRAFFIC East Asia, 1999). There were no records of exports from range-states directly to China.

The majority of derivatives recorded in international trade by CITES Annual Reports between 1995 and 1996 were exported by China. The exception to this was the import of 5,000 items from the Republic of Korea reported by the USA. The origin of the derivatives reported in trade was not given, although the source was generally reported to be of wild origin. Derivatives were mostly reported in units of boxes and cartons. Owing to the unspecified nature of these units it is impossible to estimate the number of animals involved. The actual contents were unspecified but it is presumed that these were of processed pharmaceutical products.

Imports of *S. tatarica* horn recorded by the Korean Pharmaceuticals Traders Association (KPTA), are shown below. Value per kilogramme was stable at around US\$50 – US\$55. The KPTA report the import of 420 kg of horn in 1996 from China; there is no record of this in China's 1996 CITES Annual Report. No imports, exports or re-exports of *S. tatarica* products were reported in Korea's CITES Annual Reports between 1995 and 1997.

Recorded imports of *S. tatarica* horn into Korea, 1995 – 1997 (Source: KPTA, 1995 – 1997).

	1995		1996		1997	
Origin	Kg	US\$	Kg	US\$	Kg	US\$
Russia	-	-	-	-	1,000	50,000
Japan	1300	72,425	-	-	-	-
China	-	-	420	21,000	-	-

Source: Annual Reports of the Korean Pharmaceutical Traders Association, (KPTA), 1995-1997, Seoul, Korea.

Between 1995 and 1996 approximately 30 trophies of *S. tatarica* were recorded in CITES Annual Reports. Most of these were reported as exports to Europe and the USA from Russia and Kazakhstan. During 1996 Poland reported the import of 50 live animals from Russia. The purpose of this import was unrecorded.

As of March 1999 WCMC had not received Russia's 1996 CITES Annual Report. Consequently imports, exports and re-exports recorded by Russia are currently unavailable for 1996. Permit information was received for this period by TRAFFIC Europe-Russia from the Russian CITES Management; as no CITES Annual Report is available is not certain that the following exports took place (TRAFFIC Europe-Russia *in litt.* to TRAFFIC International, 1999b). In 1996 permits were issued for the export of 1,350 kg of horn to Thailand (of Russian origin), 360 kg of horn to Singapore (of Kazakhstan origin), and 10 kg of horn to Hong Kong (of Russian origin) (~1,720 kg in total); this would suggest the potential export of ~7,000 pairs of horn. During 1997 permits were issued for the export of 1,600 kg of horn to Singapore, 700 kg of horn to Hong Kong, and 500 kg of horn to China; all horn recorded in issued permits for 1997 was of Kazakhstan origin; suggesting the potential export of ~11,400 pairs of horn. In 1998 no export permits were issued by the Russian CITES Management Authority.

Sport hunting tour prices for *S. tatarica* advertised during 1999 were US\$ 1,390 for a *S. tatarica* hunting tour in Kalmykia, and US\$ 2,750 for a hunting tour in Kazakhstan (Almaty, Atyrau and Aktubinsk) (MAVAD EUROP *in litt.*, to TRAFFIC Europe, 1999).

Due to the legal protection of *S. tatarica* in Mongolia, neither domestic nor international trade of products are officially allowed. In 1996 the USA reported the seizure of *S. t. mongolica* horn products which had been exported from Canada. Lushchekina *et al.* (1999) reported upon the recent (1995) seizure of 84 *S. t. mongolica* horns hidden in the suitcase of a passenger travelling from Ulaanbaatar to

Beijing. Milner-Gulland (1994) notes that there are difficulties in differentiating between the horns of juvenile male *S. t. tatarica* and *S. t. mongolica*.

The Kazakhstan republic's hunting union 'Okhotzooptom' reports that some 44,000 kg of horn was illegally exported in 1994 to Singapore, China, Korea, Japan and some European countries and there were believed to be 5,000 kg of horn in Turkey (Chan *et al.*, 1995).

Sokolov and Zhirnov (1998) reported that custom officers of Russia and other countries of the former USSR have recently seized large shipments of horns destined for the South-East Asian market, indicating extensive poaching; they further reported that Chinese dealers visiting Russia and Kazakhstan readily purchased horns of poached animals.

TRAFFIC Europe-Russia (*in litt.* to TRAFFIC International, 1999a) report that a permanent channel in illegal trade operates in Russia; illegally obtained horn from Russia and Kazakhstan is collected into a shipment in Moscow or nearby, and then transported by train from Moscow to Beijing, where it enters the Chinese market. Small quantities of horn are also smuggled out of Russia via the Caucasus, and direct smuggling from Kazakhstan to China occurs (TRAFFIC Europe-Russia *in litt.* to TRAFFIC International, 1999a).

During 1995 New Zealand seized 11 bags of *S. tatarica* (contents and quantity unrecorded); the exporting country and origin were unrecorded. During 1996 the USA reported the seizure of over 2,000 derivatives of an unspecified nature. Almost all of these were recorded in the USA CITES Annual Report as exports from the Republic of Korea. Small seizures of products have been reported in Hong Kong between 1995 and 1998 (Agriculture and Fisheries Department of Hong Kong SAR Government *in litt.* to TRAFFIC East Asia, 1999).

The actual scale of illegal trade in *S. tatarica* remains difficult to assess as detection and reporting appear to be at a relatively low level. Once horn enters the market it is difficult to ascertain legality. Poaching is known to be a problem in range states, seizures have been made and the illegal trade is known to be on-going. It is therefore difficult to assess the impact of trade on populations when trade data are incomplete.

Gross exports of *Saiga tatarica*

TAXON	TERM	UNIT	CTRY	1995	1996	total	Average
Saiga tatarica	DER		CA	0	20	20	10
Saiga tatarica	DER		CN	182	134	316	158
Saiga tatarica	DER		KR	5000	2024	7024	3512
Saiga tatarica	DER	BAG	XX	11	0	11	5.5
Saiga tatarica	DER	BOX	CN	1100	100	1200	600
Saiga tatarica	DER	CAR	CN	461	1102	1563	781.5
Saiga tatarica	DER	KG	CN	0	3	3	1.5
Saiga tatarica	HOR	KG	HK	3590	3586	7176	3588
Saiga tatarica	HOR	KG	JP	1000	0	1000	500
Saiga tatarica	HOR	KG	MY	948	0	948	474
Saiga tatarica	HOR	KG	RU	4200	0	4200	2100
Saiga tatarica	HOR	KG	SG	2091	0	2091	1045.5
Saiga tatarica	LIV		DE	0	1	1	0.5
Saiga tatarica	LIV		RU	0	50	50	25
Saiga tatarica	SKI		KZ	0	7	7	3.5
Saiga tatarica	SKU		KZ	0	7	7	3.5
Saiga tatarica	SPE		RU	11	0	11	5.5
Saiga tatarica	SPE		US	1	1	2	1
Saiga tatarica	TRO		MY	0	1	1	0.5
Saiga tatarica	TRO		RU	24	2	26	13
Saiga tatarica	TRO		US	1	0	1	0.5
Saiga tatarica	TRO		XX	0	2	2	1
Saiga tatarica mongolica	HPR		CA	0	1	1	0.5

Note: the unshaded rows in the table indicate records involving known or possible

range states.

CONSERVATION MEASURES

China: *S. tatarica* is listed as a Class I protected species under China's *Wild Animal Protection Law* (1989). Class I listed species are those considered to be threatened with extinction and banned from commercial trade. A special licence issued by the department of wildlife administration under the State Council must be obtained for the catching and hunting of these species - usually issued for research and conservation purposes only.

Sale, purchase or utilisation of wildlife under first class state protection or the products thereof requires a permit. Import and export of wildlife under special state protection and/or the products thereof whose import or export is restricted by international conventions to which China is a party, must be approved by the department of wildlife administration under the State Council or by the State Council (CITES Management Authority of China, 1995a).

S. tatarica is listed as a Class I protected species in the *Regulations on the Conservation and Management of Wild Resources of Medicinal Plants and Animals* (1987). Class I protected species are defined as rare and precious species threatened with extinction. Hunting, collection and export of Class I protected species is prohibited (State Council of the People's Republic of China, 1987).

An official letter (No. 133) issued by the Ministry of Forestry (now State Forestry Administration) details the correct procedures for the export of medicines containing wild animals. Export of medicines containing wild animals must be carried out in accordance with the *Wild Animal Protection Law* (1989) and CITES. Export of medicines containing animal parts as detailed in list attached with the letter (30 medicines containing saiga horn are listed) are prohibited. Documentation issued by the CITES MA must be submitted to customs for approval of export (CITES Management Authority of China, 1995b).

An official notice (No. 48) from the CITES Management Authority and Chief of Customs provides reference for the procedures for export of products made from wild animals. The import, export and re-export of products, including materia medica and products thereof, as detailed in the list attached with the notice (including saiga horn) require a CITES export permit or certificate required under the *Wild Animal Protection Law* (1989) before approval to import, export and/or re-export may be granted by customs (CITES Management Authority of China, 1997).

Kazakhstan: harvesting and export are conducted by state-owned hunting agencies. The Kazakhstan Republic's hunting union 'Okhotzooptom' has had exclusive rights over the hunting and commercial exploitation of *S. tatarica* since 1989. The hunting season is presently restricted by hunting regulations to between the 1st September and 30th November. Licensed non-commercial hunting on a small scale was allowed to resume during the early 1990s, although this is mostly restricted to recreational hunting by foreign tourists (Bekenov, *et al.*, 1998).

The Institute of Zoology of the Kazakhstan Academy of Sciences makes recommendations through surveys and models of population dynamics about where and at what time of year *S. tatarica* may be hunted, how many animals may be killed each year and how many animals should come from each age and sex class. These recommendations are made to preserve optimum numbers and population structure (Bekenov, *et al.*, 1998).

In 1998 the Institute recommended that legal harvests from the Betpak-dala population be completely suspended due to concerns about the lack of recovery of this population from the severe winter of 1993/1994 (A.B. Bekenov and Iu.A. Grachev *In litt.* to IUCN Species Survival Commission, 1999).

Kazakhstan is currently not Party to CITES.

Korea, Republic of: as a medicinal item, *S. tatarica* horn trade is subject to the Pharmaceutical Affairs Law (1997). Those wishing to import/export CITES listed items for medicinal purposes must first obtain a permit from the Commissioner of the Korea Food and Drug Administration (KFDA) under the Ministry for Health and Welfare. For imports of *S. tatarica* horn, one copy of the export permit, 5 copies of the Import Approval Application/Sales Contract or the Import contract must be submitted to the KFDA for approval.

Mongolia: *S. tatarica* is protected under The Mongolian Law on Hunting (5 June 1995). *S. tatarica* are classed under 'Very Rare Animals', further defined as "those animals which have a restricted natural restoration capacity, a limited distribution, no reserves for use, and are in danger of extinction." *S. tatarica*, and other 'Very Rare Animals', may only be hunted or trapped for research and investigation purposes pursuant to permission from the State Administrative Central Organisation in charge of nature and environment. It is prohibited to hunt, trap, or sell the hides, fur or any other part of a 'Very Rare Animal' without such permission. Export of 'Very Rare Animals' is permitted according to international treaties and laws to which Mongolia is a signatory. (The Mongolian Law on Hunting, 1995).

In 1993, the "Sharga-Mankhan" Saiga Reserve, consisting of two separated areas (2000 sq. km in the Shargyn Gobi semi-desert basin and 200 sq. km in Mankhan district), was established for the protection and conservation of the last two populations of *S. t. mongolica*.

From 1985 to 1989, around 100 young *S. t. mongolica* were introduced into the Trans Altai Gobi. Unfortunately the area in which the reintroduction took place was part of the previous range of *S. t. tatarica* and was outside of the range of *S. t. mongolica*. The animals dispersed widely and the final results of their acclimatization are as yet unpublished (Lushchekina *et al.*, 1999).

Russia: harvesting and export is controlled by State agencies; special permits from the government of Kalmykia are required to export horns (Chan *et al.*, 1995) The legal harvesting of the Kalmyk population was suspended in 1986, but has since been re-opened experimentally. Around 11,000 animals were harvested in 1990 by Kalmyk State Game Enterprise to support the economy. In 1993, sport hunting of 500 animals was permitted; by the autumn only 98 had been shot (Sokolov and Zhirnov, 1998).

The "Chernye Zemli" zapovednik (protected area) of 96,000 ha was established in 1990 in the south of Kalmykia. It has been suggested that this is too small to effectively conserve the Kalmyk population of *S. tatarica* (Sokolov and Zhirnov, 1998).

Taiwan: *S. tatarica* is listed as Protected Wildlife (in the category of "rare and valuable species") under the Wildlife Conservation Law (WCL). Captive animals (such as under zoo care) are also regulated by the WCL. According to the WCL, protected species and their products shall not be traded, imported or exported unless under special circumstances recognised in the WCL or related legislation. The WCL also stipulates that no import or export of live wildlife or products of Protected Wildlife are allowed without prior approval from the central government authority. The import or export of live specimens of Protected Wildlife are limited to academic research institutes, colleges or universities, public or licensed private zoos for education or academic research and circus performances (Council of Agriculture, Taiwan, *in litt.* to TRAFFIC East Asia, 1999).

CAPTIVE BREEDING

S. tatarica are considered one of the most difficult wild ungulates to keep in captivity. They are difficult to maintain, have a high susceptibility to stress and disease and a short life span (Sokolov and Zhirnov, 1998). Animals are most successfully kept in large enclosures resembling steppe habitat under conditions close to semi-captivity (Sokolov and Zhirnov, 1998).

Sokolov and Zhirnov (1998) have suggested that the early maturity, high fecundity, herd instinct and easy domestication of the species could help the development of *S. tatarica* farming in the arid belts of Eurasia.

China: one province (unspecified) apparently farms *S. tatarica*. Total number of animals at the farm as of 1997 was 26 including 8 offspring (Guo *et al.*, 1997).

Mongolia: there are no known captive breeding operations for *S. t. mongolica* (TRAFFIC East Asia *in litt.* to TRAFFIC International, 1999).

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Tayassu pecari (Link, 1795)

White-lipped Peccary
Pecarí de labio blanco
Pécari à barbe blanche

Order: ARTIODACTYLA

Family: SUIDAE

SUMMARY

A widely distributed Central and South American species. There are few population data but it is not considered seriously threatened in the South American part of its range. However, most of the remaining Central American populations are threatened to varying degrees. Reported international trade during the period 1991-1996 was mainly in skins or skin products and amounted to about 115,000 animals, all from Peru. Exports from Peru ranged from 9,600 in 1993 to over 40,000 in 1996 when the price paid for skins was briefly increased. The trade in skins is almost entirely a by-product of the harvest of animals for meat. Sustainable harvest levels have been calculated for Peru and the international trade in skins generally falls within these levels. There is no evidence that international trade is affecting populations of the species.

The species is recommended under Decision 10.79 for inclusion in category d (iii).

DISTRIBUTION AND POPULATION

Recorded from south-eastern Mexico through Central America and northern and central South America as far south as Entre Rios in northern Argentina and Rio Grande do Sul in southern Brazil.

The White-lipped Peccary is not considered seriously threatened nationally over much of its extensive range and is not listed as globally threatened in IUCN (1996). However, most of the remaining populations of Central America are threatened to varying degrees. It is rare and local there, suffering from habitat loss and excessive hunting (Reid, 1997).

March (1993) noted that data on the distribution and status of the species were lacking or inadequate for many of the countries in which it had been recorded, but that, nevertheless, it was evident that its former range had been severely reduced and fragmented during recent decades.

Five subspecies were recognised by Grub and Groves (1993): *Tayassu pecari equatoris* Lonnberg 1921, *T. p. albirostris* Illiger 1815, *T. p. pecari*, *T. p. ringens* Merriam 1901 and *T. p. spiradens* Goldman 1912.

Argentina (*T. p. albirostris*) March (1993) noted that it occurred in the north, south to Santiago del Estero and Entre Rios. Some reports indicated that significant population declines had occurred in the dry Chaco of the north-west.

Belize (*T. p. ringens*) Apparently widespread (March, 1993).

Bolivia (*T. p. albirostris*) Apparently widespread in the east. Some reports indicated that significant population declines have occurred in the dry Chaco of the south-east (March, 1993).

Brazil (*T. p. albirostris*) Present. The Amazon Basin, most of which lies within Brazil, was noted by March (1993) as by far the most important stronghold for the species. Schaller (1983) estimated a density of 1.6 per km² in the Mato Grosso. Peres (1996) found it in large herds in central-western and eastern Brazilian Amazonia, but noted that they appeared to be rare and moved widely even in remote *terra firma* forests that had been entirely spared from hunting. He thought that this might be due to the low density of key resource patches.

Colombia (*T. p. equatoris*, *T. p. pecari*, *T. p. spiradens*) Reported from north-western, south-western and eastern parts of the country (March, 1993).

Costa Rica (*T. p. spiradens*) Occurs in a number of reserves and other protected areas (March, 1993).

Peru Peccaries continue to be widely hunted for their meat and pelts (Anon., 1998; Bodmer, 1999; Peres, 1996).

INTERNATIONAL TRADE

The overwhelming proportion of trade in *Tayassu pecari*, as recorded in CITES Annual Reports for the period 1991-1996 was in skins, skin pieces and/or products (garments, shoes, watch-straps). There was negligible international trade in other body parts and the only significant transaction involving live animals was of 297 exported from Peru in 1994. The only range state reported as exporting skins was Peru, with a total of about 115,000 reported in the period 1991-1996, ranging from 9,622 in 1993 to 40,602 in 1996.

The species was listed in Appendix II in 1987 and during the three years 1988-1990 the pattern of trade was different from that recorded subsequently. The exports from Argentina fell from 22,521 in 1988 to only 2,000 in 1990 as the stocks registered in 1987 were cleared. Bolivia exported over 23,000 skins in 1989 but much smaller numbers in 1988 and 1990. Exports from Peru more than doubled from 4,371 in 1988 to 10,438 in 1990.

Peru

The reported exports from Peru, which averaged about 19,000 skins annually, showed a decreasing trend from 1991 to 1993, followed by an increase to a peak in 1996, when over 40,000 skins were reported in trade. L. A. Lozano (*in litt.* to WCMC, 1999) provided details of officially registered exports of skins from Peru:- 1993: 18,609, 1994: 12,908, 1995: 18,644, 1996: 42,067; these figures, except that for 1995, are all higher than those reported to CITES. Bodmer (1999) noted that it is possible that a proportion of the trade from Peru reported as *Pecari tajacu* is in fact *Tayassu pecari*. He observed that studies of hunting indicated that more of the latter than the former were being harvested in Peru. However, skins of the former are valued more highly in the international leather trade and there may, therefore, be some incentive to misdeclare exports (or imports). He noted that total recorded exports from Peru for *P. tajacu* for the period 1991-1995 were lower than recorded imports of this species for the same period, while for *T. pecari* the situation was reversed. He suggested that, in some cases, skins exported as *T. pecari* may have been declared on import as *P. tajacu*; however, this is unlikely to be the case as the importing countries base their reports on the export permits received.

Peccary skins have been exported in quantity from Peru since at least 1920. At this time the Amazon rubber boom collapsed and rural inhabitants began to look for other sources of income. One of these was the export of wild animal pelts to Europe and North America (Bodmer, 1999). These were sold through a system of professional pelt hunters and traders from 1920 until 1973. During this period *Tayassu pecari* and *Pecari tajacu* were the most frequently hunted animals. Between 1946 and 1973, nearly 1.3 million *T. pecari* were exported in total. Overall, exports steadily rose from 1946 until the early 1970s when they began to fall. Peccaries were harvested by all types of hunters because they were a common source of meat, although the value of the pelts was relatively low (ca US\$ 1 per skin). By 1970 hunters reported that peccaries were harder to find and export levels dropped, apparently as a result of overhunting having depleted populations. Numbers of *T. pecari* reported in trade decreased from 86,261 in 1974 to 18,729 in 1977, perhaps indicating increasing numbers of this species were being declared as *P. tajacu*. Exports for 1987-1989 were around 16,000-20,000 annually (Bodmer, 1999).

Gross exports of *Tayassu pecari*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	Total	average
BEL		IT	0	0	0	0	179	93	272	45.3
BEL	PAI	IT	0	0	0	0	5	0	5	0.8
BOC		JP	13	0	0	0	0	0	13	2.2
GAR		DE	0	0	0	548	0	0	0	0.0
GAR		HU	2072	186	1480	0	0	0	3738	623.0

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	Total	average
GAR	PAI	DE	0	0	0	0	0	897	897	149.5
GAR	PAI	HU	9117	20148	5322	0	0	0	34587	5764.5
LIV		BR	5	3	0	0	0	0	8	1.3
LIV		BZ	2	0	0	0	0	0	2	0.3
LIV		PE	0	0	0	297	0	0	0	0.0
LPS		CH	0	0	0	1	0	0	0	0.0
LPS		DE	0	0	0	0	0	666	666	111.0
LPS		IT	0	0	0	119	267	0	267	44.5
LPS		PE	0	0	0	0	0	1540	1540	256.7
LPS	PAI	DE	0	0	0	0	0	211	211	35.2
LPS	PAI	IT	0	0	0	0	186	0	186	31.0
SHO		AR	0	0	0	1	0	0	0	0.0
SHO		ES	0	0	20	0	0	24	44	7.3
SHO		IT	264	12	29	1942	10580	16916	27801	4633.5
SHO		PE	0	0	0	72	0	155	155	25.8
SKI		DE	620	0	0	0	0	185	805	134.2
SKI		IT	0	0	0	0	83	657	740	123.3
SKI		PE	27469	18575	9622	11900	18644	40602	114912	19152.0
SKI	KG	IT	0	0	0	0	0	235	235	39.2
SKI	KG	PE	566	0	119	0	0	0	685	114.2
SKO		CA	0	0	0	0	0	2169	2169	361.5
SKO		DE	202	0	81	0	0	0	283	47.2
SKO		FR	6	0	0	0	32	26	64	10.7
SKO		IT	1244	71	134	0	35	13	1497	249.5
SKO	PAI	DE	0	159	0	0	0	0	159	26.5
SKO	PAI	IT	56	0	0	0	0	0	56	9.3
SKP		DE	0	11616	0	0	0	8695	20311	3385.2
SKP		IT	68	0	0	0	0	0	68	11.3
SKP		PE	0	0	0	0	0	80	80	13.3
SKP	KG	PE	835	453	482	0	0	1465	3235	539.2
SKP	SQF	PE	0	300	0	0	0	0	300	50.0
SKS	KG	PE	76	0	0	0	0	0	76	12.7
SKU		PY	0	0	2	0	0	0	2	0.3
SPE		BO	0	0	0	0	0	70	70	11.7
SPE		CA	0	0	1	0	0	0	1	0.2
SPE		PY	0	0	2	0	0	0	2	0.3
SPE	CCM	BO	0	0	0	400	0	0	0	0.0
SPE	KG	PE	0	0	0	0	30	0	30	5.0
TRO		AR	0	0	0	0	0	11	11	1.8
TRO		MX	0	0	0	0	0	5	5	0.8
TRO		ZA	0	0	0	1	0	0	0	0.0
UNS		IT	0	0	0	0	60	0	60	10.0
WAT		AT	6	175	0	0	0	0	181	30.2
WAT		CA	79	0	0	0	0	97	176	29.3
WAT		CH	9	0	2	0	0	0	11	1.8
WAT		FR	10	0	0	0	0	0	10	1.7

In the above table the unshaded rows are those relating to trade from range states of the species.

CONSERVATION MEASURES

Bodmer *et al.* (1993) detailed four objectives for conservation action for peccaries:

1. To promote the sustainable utilisation of healthy populations of both peccaries by subsistence hunters, based on sound management principles.
2. To develop and improve local legislation and enforcement procedures appertaining to the management of peccary populations in the various Latin American countries.
3. To promote the improved monitoring and control of trade in peccary meat and hide products

- and the prohibition of hunting for purely commercial purposes.
4. To encourage the return of profits from peccary hides sold as by-products of subsistence hunting to rural communities which should be utilised to improve peccary management and conservation, as well as the wider issues of habitat protection and sustainable rural development.

Argentina: All trade, including export and inter-provincial transit, in peccary products was prohibited in 1988 via Resolution 793/88 of the Secretaría de Agricultura, Granadería y Pesca (Porini, 1993). However, Bodmer *et al.* (1993) reported that commercial hide hunting was prohibited in 1987, but continued in practice until at least 1990, when the peccary market was closed. The declaration of all skins held in stock was required, but no verification was carried out. Since then, only these registered stocks have been legally allowed for export (Porini, 1993). Sport hunting was permitted and was largely uncontrolled (March, 1993).

Bolivia: Categorised as Vulnerable nationally, and protected under Decreto de Veda General Indefinida (D.S. 22641) of 1990, which restricts hunting to the subsistence trade in leather (Ergueta and de Morales, 1996). Resolución Ministerial No. 14316-74 states that wild animal hides, including those of peccaries, intended for export must be tanned in Bolivia (Fuller *et al.*, 1987). A primary recommendation of the Animals Committee (AC 10.17.6) was that the Management Authority should provide to the Secretariat information on the biological basis for authorising the export of skins of this species in the numbers reported. However, no export quotas were communicated to the Secretariat from 1995 to 1999.

Brazil: The export of all wildlife was prohibited in 1967. Lei 5197 of IBDF (1967) prohibited all capture of forest animals for commercialisation of skins and regulated sport hunting (Anon., 1987).

Guatemala: The export of wild animals that are not listed nationally as endangered species, but are listed as protected species, may be allowed if the requirements established by the Management Authority are followed (Article 49 of the Law on Protected Areas, 1989) (CITES Notification No. 708).

Panama: No export permits were issued from 1991 to 1999 (D. M. Botello, *in litt.* to CITES Secretariat, 1999).

Paraguay: Sport hunting was permitted and was largely uncontrolled (March, 1993). Paraguay banned trade in wildlife and wildlife products on 4 November 1975 under Presidential Decree No. 18.796 (Fuller *et al.*, 1987).

Peru: In 1974 Peru enacted legislation prohibiting commercial hunting but permitting export of peccary pelts if they originated from subsistence hunters; however, commercial hunting continued in practice until at least 1990 (Bodmer *et al.*, 1993). Subsistence hunters have continued to harvest peccaries and sell the hides, many of which are apparently destined for export. An export quota of 20,000 tanned skins was set for 1995 and 1996 (CITES Notification Nos. 874 and 916), and this was increased to 44,300 tanned skins in 1997 (CITES Notification No. 994). No export quota was established in 1998 or 1999 (CITES Notification Nos. 1998/36 and 1999/21). Anon. (1998) evaluated the population status of peccaries in the Peruvian Amazon to determine if the current levels of exploitation were sustainable and calculated appropriate commercial quotas for the export of skins for each of four Departments. The results yielded a recommended national export quota of 41,461 individuals of this species. Bodmer (1999) calculated a conservative sustainable harvest level for the same area of 53,940 animals.

Venezuela: Categorised as being at 'Minor Risk' nationally and no specific conservation measures have been undertaken apparently (Rodriguez and Rojas-Suárez, 1995). The Ley de Protección de la Fauna Silvestre of 1970 regulates hunting. It is included on the official list of Game species by Resolution MAC-RNR-5-276 which prohibits commercial exploitation (Anon., 1987).

CAPTIVE BREEDING

The species is widely maintained in captivity in range states, but rarely elsewhere; however, it has been bred infrequently and little attempt has been made to develop co-operative breeding programmes in range state zoos where replacement stock may be obtained relatively easily. Exceptions to this are programmes in Brazil, Bolivia, Mexico and Germany (March, 1993).

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Agapornis canus (Gmelin 1788)

Grey-headed Lovebird
Inseparable malgache
Inséparable à tête grise

Family: PSITTACIDAE

Order: PSITTACIFORMES

SUMMARY

A small parrot that is endemic to Madagascar, where it is widespread and common. The reported international trade amounted to 16,450 birds during the period 1991-1996 and, although the agreed quota was exceeded in 1995 and 1996, it is unlikely that populations of the species are threatened by current trade volumes. IUCN/SSC Trade Programme is working with DEF to undertake a field study to determine the current population status.

The species is recommended under Decision 10.79 for inclusion in category d (iii)

This species was previously reviewed in 1992 (WCMC and IUCN/SSC TSG, 1992) when Madagascar was encouraged to establish an export quota.

DISTRIBUTION AND POPULATION

Comoros: introduced and fairly common to common on Anjouan, Grand Comore and Moheli (Benson, 1960). It was seen regularly on Moheli in 1975 (Cheke and Walsh, 1986).

Madagascar: Dee (1986) gave a comprehensive account of past distribution and status: 'Widespread and common. There are two subspecies: *A. c. cana* [sic] (Gmelin) is found throughout except for the south-western and central plateau, there it is replaced by *A. c. ablectanea* [sic]. Distribution does not appear continuous. A hundred years ago it was said to be very abundant except in central plateau and communal except in breeding season (Milne-Edwards and Grandidier 1879). Recorded from the length of the east and said to be much commoner on coastal plain than on mountain slopes behind (Rand 1936). Recorded from Berenty Reserve (west of Fort-Dauphin) (Adamson *et al.* 1982, Pringle 1985), Fort-Dauphin area (specimen collected in 1756) (Stresemann 1952), Andohahela (R. N. I. no. 11) (Pidgeon and O'Connor 1985), Manantenina (Benson *et al.* 1976), Manombo, Vondrozo, Ivohibé, Ihosy (Delacour 1932a), forest land between the Betsileo and Tanala, where common, west of 46°55'E in southern central plateau: Bara country, where common (Deans Cowan 1882), Mahanoro, 60 miles north-west of Mahanoro (Richmond 1897), Tsimbazaza, where breeding proved (Milon *et al.* 1973), offered for sale in Antananarivo (Siegfried 1970, O. Langrand *in litt.* 1986), Ambatoloana (Salvan 1972a), Mangabe (Kaudern 1922), Hivondrona (near Tamatave) (Sibree 1915), many for sale in Tamatave (Roch and Newton 1863), Mohambo (Newton 1865), very common on Ile de Saint-Marie (Sganzin 1840), Maroantsetra (Steinbacher 1972), Antalaha (specimen in LACMNH), Marojejy Reserve (R. N. I. no. 12), Sumbava (Benson *et al.* 1976), Sakaramy, Ampasindava (Diégo-Suarez) (van Someren 1947). In the west (where offered for sale: O. Langrand *in litt.* 1986) recorded from Nosy Bé (Ménégaux 1907, O. Langrand *in litt.* 1986), to Mahafaly country (Ménégaux 1907), Sambirano (Rand 1936, Milon *et al.* 1973), Bora (Antsohihy), between Port Bergé and River Sofia (Malcolm 1970), not infrequent between Mampikony and Andriba (16°30'S 46°57'E), Bembatokabai (Bombetoka) (von Berlepsch 1898), km 360 along Antananarivo to Majunga road (Malcolm 1970), Marovoay (Kaudern 1922), Soalala, Namoroka (Delacour 1932b), Baly Bay (Curl 1983), Maintirano, Tsiandro, Ankavandra, Tsiroanomandidy, Bekopaka (Delacour 1932a), Ankarefo (Delacour 1930), Miandrivazo, Morondava delta (Bangs 1918), Morondava (Steinbacher 1972). Said to be less common in south-west (Delacour 1932a) (however, Milon *et al.*, 1973, call it rather common there). Recorded from: Mangoky to Cap Sainte-Marie (Lavauden 1937), Mangoky area where breeding occurs (Appert 1968b, 1972a), Lake Ihotry (Delacour 1932a, Griveaud 1960a), Befandriana (Delacour 1932a), mid-way between Sakaraha and Tuléar (Benson *et al.* 1976), Lower Fiharenana (Ménégaux 1907), Tuléar, Ampotaka (Delacour 1932a).'

The species was still described as common in 1991 (O. Langrand, *in litt.* to the Trade Specialist Group, 1991). The Madagascar CITES MA (1991) stated that it was very common in that country, but that no population studies had been carried out. Collar (1997) stated that it was generally widespread and common, more so in coastal areas, but had become uncommon in the east and rare on the High Plateau. Goodman *et al.* (1997) found that it was relatively common in spiny forest and distinctly less common in agricultural and grassland areas near and in humid forest up to 325 m; it was also uncommon in littoral forest, e.g. Mandena and Itapera. A. P. Raselimanana (*in litt.* to

IUCN/SSC Trade Programme, 1999) also commented on a decrease in numbers on the High Plateau, due to habitat destruction.

Mauritius: introduced, but wiped out by a cyclone in 1892 (Meinertzhagen, 1912; Staub, 1976). Also introduced before 1725 on Rodrigues, where it was common in the 19th century but has become very rare (Gill, 1967; Staub, 1976).

Mayotte: introduced and common - flocks of up to 80 were noted (Benson, 1960).

Réunion: introduced and very rare (Schlegel and Pollen, 1868; Gill, 1967; Staub, 1976).

Seychelles: introduced on Mahé and Silhouette (Gaymer *et al.*, 1969). Penny (1974) stated that 'for some years it was very common all over Mahé ... then, quite suddenly, it became scarce' and was subsequently restricted to a few areas where 'flocks of up to fifty birds' occurred.

Tanzania: apparently introduced on Zanzibar and Mafia Island; it was reported 'in the wild state' up until about 1913 (Mackworth-Praed and Grant, 1952) but not after 1920 (Britton, 1980). However, Pakenham (1979), in his review of the avifauna of Zanzibar and Pemba, could find no justification for including this species, and Baker (1990) recommended the removal of the species from the list of the avifauna of Tanzania.

South Africa: possibly introduced in Natal (Clancey, 1964).

HABITAT AND ECOLOGY

The species occurs in brush, open ground on the edge of forest, wooded savanna and degraded forest, rice-fields and other cultivations bordering disturbed woodland and settlements, and less arid parts of the semidesert zone. Occurs up to 1,500 m but is generally in low-lying areas (Collar, 1997). It is usually found in small groups of up to 20 individuals (Goodman *et al.*, 1997), but flocks of 80 birds have been recorded, and sometimes about 100 are found together (A. Raselimanana *in litt.*, 1999). They feed mainly on grass seeds procured on the ground; around villages they may raid rice spread out to dry. Goodman *et al.* (1997) found that foraging flocks were often more active in the morning than in the afternoon and consisted disproportionately of males. The breeding season in Madagascar is stated to be November-December by Collar (1997), but Goodman *et al.* (1997) found them commencing to breed in April or May. In the Comoros they breed in February (Collar, 1997) or probably November-April (Juniper and Parr, 1998). The nest is a tree-hole and, in captivity, 3-6 eggs are laid, incubation lasts for 23 days and fledging takes 43 days (Collar, 1997).

THREATS TO SURVIVAL AND DOMESTIC USE

Madagascar: O. Langrand (*in litt.* to the Trade Specialist Group, 6 June 1991) found that it was commonly kept as a cagebird in the major cities of Madagascar; however, he considered forest destruction to be the main threat to the species. The Madagascar CITES MA (1991) considered the survival of the species was not threatened by international trade, only by habitat destruction. A. P. Raselimanana (*in litt.* to IUCN/SSC Trade Programme, 1999) pointed out that, although the number of birds involved in international trade was not a problem for the species as a whole, if large numbers of birds in one flock were being trapped this could seriously affect local populations.

Mauritius: It was reported to be 'severely hunted' on Rodrigues because of its maize-eating habits (Staub, 1976).

INTERNATIONAL TRADE

Minimum net imports of *Agapornis canus* reported to CITES fluctuated between 3,167 and 12,373 from 1983 to 1988 (WCMC & IUCN/SSC TSG, 1991). The chief importers were the Netherlands, Belgium and the Federal Republic of Germany. Most originated in Madagascar but some birds, probably almost entirely re-exports rather than captive-bred individuals, were exported from European countries.

During the period 1991-1996 a total of 16,450 live birds were exported, with an increase from 1,286 in 1991 to 5,906 in 1995, falling again to 4,110 in 1996. Most of these were of wild or unstated origin, and only 4% were reported as captive-bred (mostly from South Africa). Nearly all originated in Madagascar, with a few from the

introduced populations in Mauritius. The main importers were France, Belgium, the Netherlands and South Africa.

The export quotas set by Madagascar (see Conservation Measures) were exceeded by exports reported by Madagascar in both 1995 (by 57%) and 1996 (by 17%).

Gross exports of *Agapornis canus*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	total	average
BOD		AU	0	0	1	0	0	0	1	0.2
BOD		MG	0	0	0	0	0	1	2	0.3
LIV		AN	0	0	0	1	0	0	1	0.2
LIV		BE	6	0	5	4	88	0	15	2.5
LIV		BR	0	0	0	0	33	0	0	0.0
LIV		CL	0	0	0	0	0	1	2	0.3
LIV		DK	0	7	0	0	0	0	7	1.2
LIV		FR	0	0	0	0	200	0	0	0.0
LIV		GB	0	0	0	0	4	0	0	0.0
LIV		MG	1120	932	1622	4614	5495	4081	16450	2741.7
LIV		MU	120	250	0	0	0	0	370	61.7
LIV		NA	0	0	0	0	10	0	0	0.0
LIV		NL	40	7	1	4	32	0	52	8.7
LIV		OM	0	2	0	0	0	0	2	0.3
LIV		ZA	0	2	443	250	44	28	751	125.2
LIV		ZW	0	2	2	0	0	0	4	0.7
SPE		MG	0	0	0	0	0	1	2	0.3

The maximum price noted per bird in the UK rose from £16 in 1975 to £75 in 1978, and then fluctuated from £35 (1981) to £80 (1988) from 1979-1993, finally rising to £100 in 1994 and £125 in 1995 (WCMC files). A shipment of birds from Madagascar to Belgium was priced at 25 FrF (= US\$?) per bird (TRAFFIC Europe, *in litt.* to WCMC, 1999).

CONSERVATION MEASURES

Madagascar: In 1992 exports were apparently supposed to be limited to captive-bred individuals and it was classed as a game species under the national plan (WCMC and IUCN/SSC Trade Specialist Group, 1992). An annual export quota of 3,500 birds has been established since 1995 (CITES Notifications Nos. 874, 916, 994, 1998/36), but this is not based on surveys and no management plan has been developed (A. Raselimanana *in litt.*, 1999). IUCN/SSC Trade Programme is working with DEF to undertake a field study, as recommended in WCMC and IUCN/SSC TSG (1992).

Collar (1997) noted that it was listed for 25 protected areas.

CAPTIVE-BREEDING This species has never been properly established in captivity and; although there have been many breeding successes, aviculturists have generally neglected to build up aviary-bred strains (Low, 1992). There is no regular captive-breeding in Madagascar (A. Raselimanana *in litt.*, 1999). Breeding on a small scale has taken place in France, Germany, the Netherlands, UK and USA (O. Langrand *in litt.* to the Trade Specialist Group, 6 June 1991). In the USA a survey in 1990 reported 28 young reared from 18 breeding pairs (Allen and Johnson, 1991). In the UK a survey in 1990 reported 18 young reared (Coombes, 1991). Lietzow (1996) described the breeding the species in captivity in detail.

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Cacatua ducorpsii Pucheran, 1853

Ducorps's Cockatoo
Cacatua de las Salomón
Cacatoès de Ducorps

Order: PSITTACIFORMES

Family: PSITTACIDAE

SUMMARY

The species occurs on a number of islands to the east of New Guinea, mainly those in the Solomon Islands. It has been described as common on nearly all of the islands on which it occurs. An annual average of 825 birds was reported in international trade during the period 1991-1996 and this is unlikely to be a threat to populations of the species.

The species is recommended under Decision 10.79 for inclusion in category d (iii)

DISTRIBUTION AND POPULATION

The species occurs in Papua New Guinea and the Solomon Islands. Referring to its status in general Mayr (1945) noted it as common, and Rowley (1997), whilst maintaining that precise information was lacking, stated that it was still common, though likely to suffer in the future as a result of increased pressure from logging. Juniper and Parr (1998) also considered it to be common in a variety of habitats, with a world population of over 100,000 and stable.

Papua New Guinea: occurs on the islands of Bougainville and Buka, where Coates (1985) described it as common and conspicuous. In 1984, in southern Bougainville it was found at all altitudes but most frequently between sea level and 700 m (Schodde, 1977).

Solomon Islands: Occurs on Choiseul, Ghizo, Guadalcanal, Kolombangara, Malaita, Mbava, New Georgia, Nggatokae, Nggela Sule, Ranongga, Rendova, Russell Islands, San Jorge, Santa Isabel, Shortland Islands, Tetepare, Vangunu, and Vella Lavella (Juniper and Parr 1998). Cain and Galbraith (1956) found it 'almost everywhere on Guadalcanal up to lower limit of mist forest, but not seen within it'. Henderson (in Forshaw, 1989) described it as common in June 1979 in northern Guadalcanal, in upland forests as well as in the lowlands. Blaber (1990) found it to be abundant and conspicuous throughout New Georgia, most common in primary forest but occurring in and around villages where fruit was available. Webb (1992) described it as common and ubiquitous on Santa Isabel. Buckingham *et al.* (1996?) described it as common on most islands. They found it less common on Kolombangara, with a maximum daily count of seven and densities varying from 4.5 to 24 per km². On Ghizo, flocks of 40, 16 and 33 were seen and a density of 30 birds per km² was noted. On Rendova 63 were counted in primary forest. On Guadalcanal, it was uncommon in the plains around Honiara, with only occasional birds seen near Henderson airport. G. Dutson (*in litt.* to IUCN/SSC Trade Programme, 1999) found densities of 10s/km² in lowland forest.

HABITAT AND ECOLOGY

On Bougainville recorded in most lowland timbered areas, including trees in and around village gardens, and in the canopy of stunted cloud forest at about 1,700 m (Coates 1985). Eats fruits, seeds, blossom, leaf buds, epiphytes, large caterpillars and soft-bodied insects; raids native gardens, eating paw-paws and digging up sweet potatoes (Rowley 1997). Breeding in the wild was, until very recently, unknown. Eleven nests with young, estimated to be 4-5 weeks old, were found in natural cavities in trees in June, July and August. The brood size was 1-3 chicks (Webb 1997).

THREATS TO SURVIVAL AND DOMESTIC USE

Juniper and Parr (1998) stated that trade is a possible future threat, as is habitat loss, particularly given the rate of clearance of lowland forests in the region. The species is kept as a pet in villages, but the low numbers involved indicate that at present this is not an issue of real conservation concern. Small numbers are held elsewhere in captivity.

Solomon Islands: G. Dutson (*in litt.* to IUCN/SSC Trade Programme, 1999) noted that there was a small domestic trade for pets, probably a few tens or hundreds per year. Turner (1997) described how the cockatoos are trapped using snares at their feeding areas. He pointed out that this might lead to an imbalance of sexes in the population because females remain in the nest and are seldom caught. He

warned of the threat of local extinctions in heavily harvested areas and reported that the people of Mbambanakira were already finding it difficult to catch parrots because of their reduced ranges. He was disturbed that the village people of Savo and Russell Islands had described being encouraged to treat wildlife harvest as a competition between villages.

INTERNATIONAL TRADE

Trade reported to CITES totalled 4,950 during the period 1991 to 1996 ranging from 100 in 1992 to 1,841 in 1994, and with a subsequent decline to 355 in 1996. Most originated in the Solomon Islands and were reported as of wild origin. The figures are unlikely to be comprehensive because the Solomon Islands are not a Party to CITES and their export figures must be derived from imports reported by other countries. Some birds (16 in 1994 and 10 in 1995) were reported as of Indonesian origin - perhaps incorrectly identified. Birds captive-bred in the Solomon Islands were reported as imported by Mexico (30 in 1993), and by Czechoslovakia (12 in 1996) but, given the few known cases of successful captive-breeding of the species (see Captive-breeding), it seems unlikely that they were captive-bred. Very small numbers of captive-bred birds were reported as exports from the Philippines, Singapore, South Africa, Switzerland and the USA. The main importing countries were Germany and Singapore, although the latter was more important as a middleman. The export quota set by the Solomon Islands (see Conservation Measures) in 1995 was exceeded by 22% according to CITES reported trade.

No illegal trade in the species was reported to CITES, but at least 8 were reported by the Belgian police as illegally imported into Belgium by car from Poland and the Czech Republic during the period 1992 to 1996 (TRAFFIC Europe *in litt.* to TRAFFIC International, 11 March 1999).

Leary (1990) mentioned that export from the Solomon Islands of *C. ducorpsii* commenced in February 1990.

Turner (1997) summarised details of exports from the Solomon Islands in 1996. He reported a total of 1,259 *Cacatua ducorpsii* exported in that year, compared with 342 reported to CITES by importing countries. Unfortunately, he did not provide details of the number exported to each country, but analysis of the various data provided suggest that the extra trade comprised 20 to Germany, 20 to Italy and the remainder to South Africa. In 1996 six exporters had a quota of 200 cockatoos each; however three of them exceeded their quota, one of them by 72%. Turner went on to note that field expeditions had indicated that parrots were trapped on Malaita and Guadalcanal. Areas on the latter where large numbers were harvested were the weather coast, Mbambanakira and Savo, Gele and the Russell Islands. Villagers were paid a maximum of S\$30 (= US\$?) per parrot and the cockatoo subsequently had a minimum value of US\$1,000 on the international market.

Other retail prices from importing countries are \$1,050 (USA, 1999), and US\$867 for single birds and US\$2,750 for pairs (USA, 15 March 1999). In the UK the maximum prices per bird noted in adverts were: £120 in the early 1970s, £1,250 in 1991, £1,500 in 1993, and £500 in 1995 (WCMC files).

Gross exports of *Cacatua ducorpsii*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	total	average
LIV		CH	0	0	0	14	8	0	22	3.7
LIV		DK	0	2	0	0	0	0	2	0.3
LIV		MT	0	0	0	11	0	0	11	1.8
LIV		MY	49	3	0	0	0	0	52	8.7
LIV		NL	2	0	0	0	32	0	34	5.7
LIV		PG	0	0	1	0	0	0	1	0.2
LIV		PH	2	2	0	0	2	3	9	1.5
LIV		PL	0	0	0	0	8	0	8	1.3
LIV		SB	716	36	582	1190	980	342	3846	641.0
LIV		SG	120	56	39	609	99	9	932	155.3
LIV		US	0	0	0	13	0	0	13	2.2
LIV		ZA	0	0	0	4	14	1	19	3.2
SPE		AU	0	1	0	0	0	0	1	0.2

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CONSERVATION MEASURES

Papua New Guinea: International trade is regulated under the International Trade (Fauna and Flora) Act 1983 (Nichols *et al.*, 1991).

Solomon Islands: An annual export quota has been established since 1991 as follows:

	1991	1992	1993	1994	1995	1996
Quota	800	?	200 per dealer	2,400	800	200 per dealer (6)

The number of dealers involved in 1993 is not known.

Leary (1990) recommended that legislation be immediately implemented to prohibit trade in this species until surveys had been conducted to determine population sizes and dynamics. However, there is no information to indicate that such surveys have been undertaken (TRAFFIC Oceania *in litt.* to TRAFFIC International, 1999).

CAPTIVE-BREEDING

Low (1992) knew of few successes: the first in Hawaii in 1982. Also bred in Switzerland (Robiller, 1997) and at Loro Parque, Canary Islands in 1996 (Sweeney, 1996 and 1997).

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Poicephalus robustus (Gmelin 1788)

Brown-necked Parrot
Papagayo robusto
Perroquet robuste

Order: PSITTACIFORMES

Family: PSITTACIDAE

SUMMARY

A widespread African parrot that is generally scarce, but patchily common. Reported international trade during the period 1991-1996 mainly originated in Tanzania, with small numbers from Mali, the Democratic Republic of the Congo and Togo. The numbers from Tanzania peaked in 1994 and decreased substantially in the following two years, but still exceeded the export quotas. This would have been considered detrimental if it had continued, but there was no reported trade from Tanzania in 1997. The trade from West Africa is more problematical because much of the reported trade apparently originated in countries where the species is rare or not known. In Mali and Togo the species is known from only one record for each country and in Guinea there have been no definite published records. If these countries continue to export this species the populations involved need to be documented and carefully monitored.

The species is recommended under Decision 10.79 for inclusion in category d (ii).

DISTRIBUTION AND POPULATION

There are three subspecies: *P. r. robustus*, *P. r. suahelicus* and *P. r. fuscicollis*. Clancey (1997) proposed that nominate *robustus* should be recognised as a separate monotypic species, based on morphological and habitat differences. However, Collar (1997) was not convinced, and pointed out that vocalisations were claimed to be identical and that the morphological differences were rather slight.

Collar (1997) provided a summary of its recent status: 'Generally scarce, but patchily common. 1500-5000 birds, South Africa, with trapping for trade apparently the cause of decline, although populations survive in over 10 conserved areas. Common, Middle Zambezi, and in the Ulugurus, Tanzania; locally common in Zambia, but sparse in N Botswana and uncommon and very local in Angola. Generally scarce or rare throughout W Africa except Ghana, where fairly common; scarce and local in Gambia; rare and local, probably only casual in Nigeria; only one record from Sierra Leone, in Nov 1938, and only a doubtful one from Togo. Annual movement out of Zambezi Valley to central plateau, Zimbabwe, reflects food shortages in former, so progressive destruction of indigenous woodland in latter area will render the species much more vulnerable.'

Angola: *P. c. suahelicus*. Occurs locally below 4,000' (= 1,220 m) in Cabinda, southern Huila north to Quilengues and along the escarpment to Quindumbo, Benguela; northern Bihe, the upper Cuango River and Cuanza Norte (Traylor, 1963).

Botswana: *P. r. suahelicus*. A sparse to uncommon resident of the extreme northern woodlands (Penry, 1994).

Burundi: *P. r. suahelicus*. Recorded by Gaugris (1976).

Democratic Republic of the Congo: *P. r. suahelicus*. Chapin (1939) noted it as frequenting montane forests up to 2,750 m, and occurring regularly in the lowlands of the south, but not in great numbers.

Côte d'Ivoire: *P. r. fuscicollis*. Thiollay (1985) stated that it was mainly restricted to *Borassus* palm southern Guinea savanna, from Sipilou to Lamto and Bougouanou (formerly Dabou), and was scarce in northern savannas (Comoé).

Gambia: *P. r. fuscicollis*. Bannerman (1953) described it as 'more numerous' in the Gambia than anywhere else in West Africa. However, Gore (1990) found it to be a scarce, local resident, found mainly in the belt of high mangrove, *Rhizophora*, which borders the river between Pirang and Sambang on the south bank. Occasionally flocks were encountered in high open woodland, but rarely far from the river or from mangrove-lined creeks.

Ghana: *P. r. fuscicollis*. Grimes (1997) described it as a not uncommon resident in mature wooded savanna, e.g. Mole (Greig-Smith 1976a), Kete Kratchi (M. Horwood), and forest edge, e.g. Mampong in Ashanti (Sutton 1970); occasional at Kumasi and one probable flock (c. 30), no date, Tafo (M. Lockwood). Subject to local movements, at least in some years, in the northern savanna (Macdonald 1978d).

Guinea-Bissau: *P. r. fuscicollis*. Bannerman (1953) described it as common.

Liberia: *P. r. fuscicollis*. Gatter (1997) described it as rare with unknown status. Only 3 records: on 2 January 1984 at Schiefflinsville, one 14 February at Mamba Point/Monrovia (S. Bass) and 1988, again there (M. E. J. Gore).

Malawi: *P. r. suahelicus*. Benson and Benson (1977) found it to be generally uncommon, perhaps more plentiful at lower levels in Nsanje and Chikwawa Dist. Dowsett-Lemaire (1989) noted it as a regular post-breeding visitor from the savanna to submontane forests, from November to February.

Mali: *P. r. fuscicollis*. Lamarche (1980) described it as uncommon, with only one observation: south of Falea, on the frontier with Guinea, in May.

Mozambique: *P. r. suahelicus*. Clancey (1996) described it as widespread, but with very few records south of the Save River. Haagner (in Clancey, 1996), stated that it was 'commoner both north and south of Beira, in the more thickly wooded areas'. Parker (1999) regarded it as an uncommon resident, occurring singly or in groups of up to five birds, and with a total population of probably more than 1,000.

Namibia: *P. r. suahelicus*. Occurs only in well wooded sections of West Caprivi (Mahango, far northern Kaudom) and sporadically in East Caprivi around Katima Mulilo south to the Salambala Reserve. The species is categorised as Endangered in Namibia (Robertson *et al.* 1998) because of its limited range and small numbers. Estimates of the total population vary from as few as 100 to a maximum of 3,650 (Simmons, 1999).

Nigeria: *P. r. fuscicollis*. 'Rare and local in savanna woodlands, probably no more than a casual visitor. Baunerman (1953) states it is "a visitor to the Plateau Province in April and May". Records are: between Kano and Zaria, Sep 1969; Damaturu, Dec 1970 (D.I.M.W.); 4 birds Jos, 16 Mar 1964 (M.H.); 2 birds Jos, August 1990 (M.Ho.); 6 sightings at Aliya, Nov-Dec. (K.&Co.). The extended date range suggests a casual visitor rather than an African migrant.' (Elgood *et al.* 1994)

Rwanda: *P. r. suahelicus*. Recorded from Rugege, Goma, Nyabitsindi, and Kibungu, (Schouteden, 1966).

Senegal: *P. r. fuscicollis*. Morel and Morel (1990) gave details of a few records in the south: a flock of six on *Terminalia* in Ngayenne forest, south-east of Niore-du-Rip on 1 November 1966; 30 south of Tambacounda in November 1966; and near Saraya, north-east of Kédougou in April-May 1983.

Sierra Leone: *P. r. fuscicollis*. Only one record, in 1938 (Collar, 1997).

South Africa: *P. r. robustus*. South-east Cape Province in Suurberge, 33°15'S 25°30'E, through the Natal midlands to west Zululand and the highlands of northern Transvaal (Zoutpansberg) (Fry *et al.*, 1988). The map in Wirminghaus (1997) indicates that there is now a gap in the distribution between 24° and 29°S, but specimens collected about 100 years ago suggest its range was originally continuous. The species has apparently disappeared recently from the inland forests of northern KwaZulu-Natal, where the last confirmed record was during the 1970s (Cyrus and Robson 1980). Wirminghaus (1997) said that numbers were believed to be perhaps fewer than 2,000 individuals. However, the results of a co-ordinated survey on 25 April 1998, combined with other estimates, suggested that even 1,000 might be a somewhat optimistic figure of the number remaining (Downs and Symes, 1998).

P. r. suahelicus. Occurs in extreme north-east Transvaal (Fry *et al.*, 1988). Not considered threatened (Brooke, 1984; Wirminghaus, 1997).

?Swaziland: *P. r. robustus*. Forshaw (1989), Fry *et al.* (1988) and Rowan (1983) all mention its occurrence in the west. However, it is not listed by Parker (1992) as occurring in the country.

Tanzania: *P. r. suahelicus*. Britton (1980) noted that it had a patchy distribution, ranging from Songea and Ufipa north to the Ugalla Game Reserve and Kibondo in the west, and from Lindi north to Morogoro in the east. Stuart and Turner (1980) had small flocks flying over forest canopy at 925 m in the Nguru Mountains. Stuart and Jensen (1981) found it to be common at 300 m in Kimboza forest, an unusual habitat. Jensen and Brøgger-Jensen (1992) found it only at the lowest levels (300 m) of the Uzungwa Mountains.

Togo: *P. r. fuscicollis*. 'Status uncertain. Only known from one specimen (*P. r. fuscicollis*) collected by R. Büttner at Bismarckburg, date unknown (Reichenow 1892, 1902a). J. von Zech collected a male west of Mpoti, 16 Jan 1899, which could be a site in Togo at 08°14'N, 00°46'E. It is more likely, however, to be a site in Ghana with a similar name at 06°49'N, 00°08'W, as von Zech also collected 2 males and a female from Kratschi (= Kété Kratschi at 07°46'N, 00°03'W). None of these specimens, which are in the MNB, were noted by Grimes (1987).' (Cheke and Walsh 1996).

Uganda: *P. r. suahelicus*. Britton (1980) stated that a party of three at Kanungu in Kigezi on 5 July 1940 was the only record for the country.

Zambia: *P. r. suahelicus*. Benson *et al.* (1971) noted that it occurred in any woodland, where it was local and nowhere numerous. Aspinwall (1984) described it as widespread but sparse; recorded in 48% of 235 atlas squares.

Zimbabwe: *P. r. suahelicus*. Irwin (1981) described it as widespread, although never numerous, in the major river valley systems and in the south-east lowveld, and certainly sparse in the drier, north-western

parts of Matabeleland. He found it to be scarce above 1,000 m and thought that it was only an irregular wanderer along the central watershed. However, Fynn (1991) detailed the occurrence of regular movements in search of food, with substantial numbers building up in one area of the central watershed from August-November. Howells (1985) found it to be common in the Dande Communal Lands, Middle Zambezi Valley, with congregations of up to 60 birds.

HABITAT AND ECOLOGY

Treated at subspecific level because of considerable differences.

P. r. robustus: The core habitat range is mosaic Afromontane evergreen forest patches between 1,000 and 1,500 m, but they forage in thornveld and bushveld, and in coastal and dune forest areas. They are reliant on yellowwoods *Podocarpus*, the dominant tree in the Afromontane forests, for food and nest sites. They are secondary cavity nesters, preferring a nest site at a height of 6-15 m from the ground. Two to four eggs are laid, which are incubated for about 28 days; the young fledge in 8-11 weeks. Though mainly resident, in many areas they make irregular feeding forays for distances of 90 km or more. The main food is seeds, particularly those of *Podocarpus falcatus* and, to a lesser extent, *P. latifolius* and *P. henkeli*; occasionally, fruits such as figs *Ficus* may be eaten (Downs and Symes, 1998; Rowan, 1983).

P. r. suahelicus: Occupies many types of woodland, chiefly well developed formations such as riparian fringing forest, intervening mopane and baobab woodland, undisturbed *Baikiaea*, and open or dense tall *Brachystegia*, with lowland or mid-altitude evergreen forest used for roosting but not feeding. In Tanzania ranges mostly up to 300 m, 925 in Ngurus; in Angola no higher than 1,500 m, but almost reaching 2,000 m in Malawi, and up to 4,000 m on Kivu, Zaire (Collar, 1997).

P. r. fuscicollis: Uses mature wooded savanna, in Côte d'Ivoire mainly in *Borassus aethiopum* palm woodland in the forest-savanna mosaic; in the Gambia it prefers *Rhizophora* mangroves, and these are probably the main habitat of this race (Collar, 1997).

Very recently, *P. r. robustus* has been the subject of a number of wide-ranging studies, the results of which are not yet published (Wirminghaus *et al.*, in prep a-h).

THREATS TO SURVIVAL AND DOMESTIC TRADE

Mozambique: Birds are sometimes taken by trappers for trade purposes (Parker, 1999).

Namibia: Considered a vulnerable species; the main current threat is deforestation, particularly of riparian vegetation by humans and elephants (Wirminghaus, 1997); the taking young birds from nests is also a problem (Simmons, 1999).

South Africa:

P. r. robustus. Declines in density have been attributed mainly to capture for trade, the shooting of birds near to crops and orchards, and to the removal of large, old yellowwood trees (Brooke, 1984; Wirminghaus, 1997).

P. r. suahelicus. The sale of nestlings as pets and for food has been reported in the northern Transvaal (Wirminghaus, 1997).

Tanzania: C. Mlingwa (*in litt.* to TRAFFIC East/Southern Africa, 1999) claimed that trade was a major threat to this species.

Zimbabwe: Collar (1997) warned that the annual movement out of the Zambezi Valley to the central watershed reflects food shortages in the former, and so progressive destruction of indigenous woodland in the latter area will render the species much more vulnerable.

INTERNATIONAL TRADE

A gross trade total of 7,499 birds was reported to CITES from 1991 to 1996, ranging from 164 in 1992 to 4,136 in 1994. Most were wild birds and originated in Tanzania (65%), Mali (7%), Democratic Republic of the Congo (5%) and Togo (5%).

The large number exported by Mali in 1996 is of concern considering the rare occurrence of the species in the country, and the total of 390 exported by Togo is worrying because there is only one unconfirmed record from the country (see Distribution and Population). Quite large numbers (15%) were also reported as originating in Guinea, a country for which there are no published records.

The numbers reported from Tanzania require further discussion. In 1992, 92 were reported as exported (72 of them reported by Tanzania) despite the existence of an export ban (see Conservation Measures). The ban was lifted temporarily in 1993, when 438 were exported, but reinstalled in September. In

1994, some specimens classified as 1993 stock (Rosser and Milliken, 1995) were exported; however, many of the export permits that were issued were cancelled before they were used and only 272 *P. robustus* were apparently exported from January to October 1994. The figure of 2,898 reported as exports for 1994 was presumably based on permits issued rather than actual trade. The quotas set by Tanzania in both 1995 and 1996 were exceeded by reported exports, but again this may be because the figures reflect permits issued.

Small numbers of captive-bred birds were reported as exports from the Dominican Republic, Germany, the Philippines, South Africa, Spain, Switzerland and Zimbabwe.

The only trade of illegal origin that was reported involved two birds imported to France from Denmark, origin Senegal. Gatter (1997) noted that this species accounted for about 1% of parrots smuggled from Côte d'Ivoire (Guiglo) to Zwedru area in Liberia.

Gross exports of *Poicephalus robustus*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	total	average
BOD	ES		0	0	0	0	1	0	1	0.2
BOD	TZ		0	0	2	0	0	0	2	0.3
LIV	CH		0	0	0	0	6	0	6	1.0
LIV	DE		3	19	10	0	0	8	40	6.7
LIV	DK		0	0	0	0	0	3	3	0.5
LIV	DO		0	0	0	1	0	0	1	0.2
LIV	ES		0	0	0	0	0	7	7	1.2
LIV	FR		0	0	0	0	0	6	6	1.0
LIV	GN		60	20	81	918	50	4	1133	188.8
LIV	ML		0	10	0	0	1	495	506	84.3
LIV	MZ		8	0	50	0	0	0	58	9.7
LIV	NL		8	0	0	40	0	6	54	9.0
LIV	PH		0	0	0	20	0	0	20	3.3
LIV	PL		0	0	0	0	0	2	2	0.3
LIV	TG		40	19	1	205	125	0	390	65.0
LIV	TZ		305	92	438	2898	998	117	4848	808.0
LIV	ZA		0	2	0	2	2	2	8	1.3
LIV	ZR		0	0	0	50	350	0	400	66.7
LIV	ZW		6	2	0	2	4	0	14	2.3

Two birds imported to France from Guinea in 1995 were valued at 700 FrF per bird (TRAFFIC Europe *in litt.* to TRAFFIC International, 1999).

Retail prices in the USA ranged from US\$925 for a single *P. r. suahelicus* to US\$1,400 for a female *P. r. fuscicollis* or *P. r. suahelicus*. In the UK maximum retail prices for the species have fluctuated recently: £750 (1990), £1,250 (1991), £400 (1992), £875 (1993), £550 (1995), presumably reflecting birds of different origin, age and condition.

CONSERVATION MEASURES

Details mainly derived from *African Wildlife Laws*, IUCN Environmental Policy and Law, Occasional Paper No. 3.

Congo: Capture and export of live birds subject to licence (S.I> 48-83, dated 21 April 1983; Act No. 49/83, dated 21 April 1983). (Mulliken, 1995)

Gambia: Fully protected.

Ghana: Capture and export of wild birds is subject to licence (Wildlife Conservation Regulations, L.I. No. 685, dated 4 March 1971; L.I. 1240, dated 15 May 1980; CITES Notification No. 231, dated 13 October 1982). Licences are issued to individuals, are non-transferrable, and specify the species and number of birds allowed to be obtained. The hunting and capture of all birds listed in Schedule 2 of the Wildlife Conservation Regulations (including all parrots) is prohibited between 1 August and 1 December, and the hunting and capture of young and/or adults accompanied by young are prohibited at all times. A 'game and trophy export permit', granted by the Chief of the Ghanaian Wildlife

Department, is required to export wild birds, as is an export licence from the Ministry of Trade for commercial exports. (Mulliken, 1995)

Liberia: A draft wildlife conservation regulation lists all parrots as totally protected (Mulliken, 1995).

Malawi: Fully protected.

Mali: Capture and export subject to licence (Ordinance No. 4/CMLN, dated 25 January 1971). (Mulliken, 1995)

Namibia: None exported since Independence in 1991, and the removal of live wild birds for commercial trade is not permitted (M. Lindeque, Ministry of Environment and Tourism, Namibia, *in litt.* to CITES Secretariat, 4 March 1999).

Nigeria: International trade prohibited since 20 April 1985 (CITES Notification No. 874).

Senegal: Commercial exports prohibited.

South Africa: Fully protected In Cape Province. Treated as Protected Game, which prohibits possession, sale, purchase, donation, conveyance, export, import or keeping in captivity without a permit, in Free State and Transvaal (TRAFFIC East\Southern Africa *in litt.* to TRAFFIC International, 17 March 1999). Wirninghaus (1996) noted that 20 artificial nest hollows were to be erected in one of the forests where *P. r. robustus* was being studied; it was thought that lack of suitable nest sites might well be a factor limiting population growth.

Swaziland: Capture, sale and conveyance prohibited

Tanzania: An export quota system was introduced in 1988 to manage the export of live birds (PAWM, 1991, cited in Rosser and Milliken, 1995). In 1991, a ban was introduced on the trade in several species, including *P. robustus*. The trade was temporarily re-opened early in 1993 but was closed again in September 1993 (Rosser and Milliken, 1995). In 1994, some birds classified as 1993 stock were exported but no quota was set for the species in that year and there should have been no trade in birds trapped then.

Export quotas were set as follows:

	1994	1995	1996	1997	1998
Quota	-	370	0	-	12

Source: CITES Notifications Nos. 874, 916, 994, 1998/36

Togo: Capture and export subject to licence (Act No. 4, dated 16 January 1968; and S.I. No 80-171, dated 4 June 1980).

Zambia: Trade of birds is prohibited (Mulliken, 1995).

Zimbabwe: Only captive-bred birds can be exported (Mulliken, 1995).

CAPTIVE-BREEDING

Lang (1969) described breeding *P. r. robustus* in Basle Zoo, where 15 young were reared from 7 clutches during the period 1964-1968. Isert and Isert (1980) bred *P. r. fuscicollis* from at least 1976 to 1980. Low (1982) described breeding *P. r. suahelicus* in 1971. Also bred at Walsrode, Germany, in Czechoslovakia, Canary Islands, South Africa and the USA (Low, 1992 and 1995). In Denmark, breeders have been successful with this species, especially *P. r. fuscicollis* (Johansson, 1998). Maddock (1996, 1997) provided details of birds registered in a stud book in the UK, including, in 1997, 2 pairs of *P. r. robustus*, 16 pairs of *P. r. suahelicus* (which produced 2 young), and 9 pairs of *P. r. fuscicollis* (which produced 4 young). Lewis (1999) stated the species was rare in the USA (with the nominate subspecies unknown), and he thought that there might not be more than 50 producing pairs in the country.

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Poicephalus rueppellii Gray 1849

Rüppell's Parrot
Lorito de Rüppell
Perroquet de Rüppell

Order: PSITTACIFORMES

Family: PSITTACIDAE

SUMMARY

A parrot that has a restricted range in Angola and Namibia. Its recent population status in Angola is poorly known but in Namibia a recent estimate gave a figure of $29,466 \pm 16,392$ birds. Reported international trade during the period 1991-1996 amounted to 808 birds, with nearly half of these in 1995. Most were reported as captive-bred and originating in South Africa and Namibia. However, there is evidence of substantial illegal trade in wild-caught birds from Namibia to South Africa. This merits investigation and could be having a significant impact on the Namibian population of the species.

The species is recommended under Decision 10.79 for inclusion in category d (ii).

DISTRIBUTION AND POPULATION

The species is not currently listed in the *IUCN Red List of Threatened Animals* (Baillie and Groombridge, 1996), however, Perrin and Selman (in press) recommend that its status be reassessed.

Angola: Occurs in the coastal plain north to Luanda, and southern and western Huila below 4,000' from the lower Cunene to Quilengues (Traylor, 1963). Fairly common in S Angola (Pinto, 1983) and frequent in Kissama National Park (Collar, 1997).

Namibia: Confined to the central and north-eastern highlands. It extends from the Gamsberg (Jensen) and the Rehoboth district in the south all along the escarpment to Swartbooi's Drift and Rua Cana Falls on the Kunene, and inland occurs as far east as Otavi and Grootfontein (Rowan, 1983). The map accompanying Simmons (1997) shows some isolated records to the east and north-east of this range. It is locally common within its 140,000 km², particularly in the north along the main dry river courses and the catchments of the ephemeral west-flowing rivers. In these areas, densities of 10 birds/km² have been recorded and the main group size was 1.9 birds. An estimate of the population size was made, based on atlas reporting rates; a regression relationship between the reporting rates and transect counts in a sample of grid cells was statistically highly significant, and was used to show that the estimated Namibian population totalled $9,700 \pm 6,665$ birds (Robertson *et al.*, 1995; Simmons, 1997). Subsequently, because the atlas coverage was seen as marginal in some areas, the population was reassessed using environmental variables in relation to field densities. These produced much higher population estimates, which are considered more robust. The new estimate is $29,466 \pm 16,392$ birds (Simmons, 1999; Jarvis and Robertson, in press).

HABITAT AND ECOLOGY

Occurs in pairs or flocks of up to 20 individuals, in well developed dry *Acacia* woodland along watercourses, also dry *Euphorbia* forests, *Brachystegia* woodland, *Adansonia*-dominated thornveld, and montane *Commiphora*/*Acacia* formations when extending upslope (generally little above 1,500 m) (Collar, 1997). The food includes pods of *Acacia* and *Faidherbia*, flowers of *Grewia*, fruits of *Ficus*, seeds of *Elephantorrhiza*, *Prosopis juliflora* and *Combretum imberbe*, nectar of mistletoe *Tapinanthus*, and insect larvae (Collar, 1997). In Namibia, the species breeds mainly in February (Collar, 1997), but with atlas breeding reports from June (Simmons, 1997); in Angola breeds March-April (Collar, 1997). Lays 3-5 eggs (Selman and Hunter, 1996) and, in captivity, the young fledge in about 4 months (Collar, 1997).

THREATS TO SURVIVAL AND DOMESTIC USE

Its popularity among bird-fanciers coupled with its relatively restricted range means a significant reduction on overall numbers could easily occur; some illegal trading certainly occurs (Collar, 1997).

Namibia: Selman, *et al.* (1998) note that this species is found in areas of extensive livestock farming, that habitat in Namibia is good and that logging is not a significant problem. Based on anecdotal

information collected through interviews with government conservationists, farmers and landowners, they conclude that the only serious threat to *P. rueppellii* is the illegal capture and export of wild birds for the international avicultural market. A lack of previous detailed information on status hinders conclusive determination of population declines. However, numerous people interviewed noted local population declines, with vastly reduced densities in some areas. Population declines were not noted in other areas, however, indicating the localised nature of trapping for trade. The Chairman of the Avicultural Association of Namibia commented that "the species will most certainly be on the endangered list within the next few years if the illegal trade that is being carried on between Namibia and South Africa at the present moment is allowed to continue unabated" (Gleuck, 1994).

Illegal trapping for the domestic trade is believed to involve very few birds, these sold on the street or at hotels (Selman, *et al.*, 1998). The number of birds legally in captivity in Namibia has been estimated at less than 100, with approximately five aviculturists considered to be very successful at breeding the species (D. Morsbach, pers. comm. in Selman, *et al.*, 1998).

INTERNATIONAL TRADE

Trade in this species was first recorded in CITES Annual Report data in 1990, the year of Namibia's independence from South Africa. The gross trade of 808 birds was recorded in CITES Annual Report data from 1991 to 1996. Gross reported trade increased significantly from 19 in 1991 to 441 in 1995, and then decreased to 162 in 1996. Most birds were reported as captive-bred and originating in South Africa (82%) and Namibia (13%). The only trade that was not reported as captive-bred involved 10 wild specimens exported from South Africa to the Philippines in 1994 and two, of unstated origin, exported to Namibia from South Africa in 1995. Exports reported to South Africa by Namibia exceeded imports from Namibia reported by South Africa in 1992, 1993, 1995 and 1996.

Export data from Namibia show the export of 76 captive-bred parrots in 1997, all of which were exported to South Africa (Lindeque, *in litt.* 1999). Export data based on permits issued in South Africa show the export of 262 captive-bred birds from that country in 1997, and 44 in 1998 (TRAFFIC East/Southern Africa - South Africa *in litt.* to TRAFFIC International, 1999).

As noted above, there is significant concern regarding illegal trade in wild *P. rueppellii* from Namibia to South Africa. According to Gleuck (1994), birds are trapped by members of the local farming community in areas outside of national parks, illegal trade amounting to 'dozens and even hundreds of birds per shipment'. The following picture of the trade has been compiled by Selman *et al.* (1998) based on interviews conducted within Namibia: birds are trapped by farm workers for small cash incentives, with many people interviewed having first-hand experience of the trade through finding employees trapping on their land. Once trapped, birds are said to be collected by dealers and then smuggled from Namibia into South Africa by car or automobile, the trade described as poor transport conditions resulting in significant mortality. Shipment size estimates have ranged from 600 to recent estimates of "80, but usually 5-10 birds". Total illegal trade is estimated to involve 1000 birds per year. The birds are believed to be purchased by aviculturists and traders in South Africa, with some bird farms said to have built up large stocks. There is concern that trade routes may have developed such that birds are also illegally exported directly to Europe, possibly transiting South Africa.

Gross exports of *Poicephalus rueppellii*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	total	Average
BOD	NA		1	0	0	0	0	0	1	0.2
LIV	CH		0	0	0	0	30	4	34	5.7
LIV	ES		0	0	0	0	7	0	7	1.2
LIV	NA		0	8	10	4	27	52	101	16.8
LIV	XX		0	0	0	0	0	1	1	0.2
LIV	ZA		18	12	0	152	373	105	660	110.0
SKI	NA		0	0	0	0	4	0	4	0.7

Selman and Hunter (1996) referred to birds of this species fetching up to US\$800 on the black market in Namibia. Captive-bred birds were advertised for sale for prices ranging from R800 (US\$126) for an individual bird to R3,000 (US\$ 480) per pair in 1998 issues of the South African avicultural magazine

Avizandum. Retail prices in the USA ranged from US\$300 to US\$700 in 1999. In the UK the maximum retail price per bird rose from £40 in 1977 to £450 in 1991 (WCMC files). Also in the UK, one 1997 captive-bred male was advertised for £500 (US\$ 814) in that year (*Mag Parrot Soc.* 31: 215) and captive-bred pairs were advertised for £875 (US\$ 1,430) in 1998 (*Mag. Parrot Soc.* 32: 215).

CONSERVATION MEASURES

Snyder *et al.* (in press) recommend that the Red List threat category for this species should be reassessed.

Angola: Occurs in Kissama National Park (Collar, 1997).

Namibia: The removal of birds from wild populations is illegal. A condition of keeping, breeding and trade is that all breeding stock have to have been legally acquired (in practice, mostly as offspring from captive breeding) and all juveniles should be marked with a closed ring (Lindeque, *in litt.* to CITES Secretariat, 1999). A permit is required for birds in captivity, but permits do not identify individual specimens, and so could conceivably be re-used in the event that the permitted bird dies (Selman *et al.*, 1998). Only captive-bred birds can be sold (Selman and Hunter, 1996). The maximum penalty for infringements of Namibian trade controls for Rüppell's Parrots is R200 (approximately US\$ 30) (Selman *et al.*, 1998).

An estimated 3,260 birds occur in protected areas (Etosha, Waterberg and Namib-Naukluft) (Simmons, 1999). A poster attempting to educate the general public and to allow customs officials to identify illegally traded birds was produced by Richard Selman and Margaret Hunter in 1998 and was sent to all customs posts and conservation stations around the country and is being used in schools for educational programmes (Simmons, 1999).

A project to develop a sustainable harvest of the species was proposed by Simmons (1995). This project would involve encouraging birds to nest in specially designed nest boxes and carrying out a detailed study of their breeding biology, which would eventually lead to determining whether a sustainable yield was possible.

South Africa Prior to Namibia's independence in 1990, *P. rueppellii* and other Namibian species were considered native wildlife under two (Transvaal and Natal) South African provincial wildlife ordinances, with stricter possession and trade controls imposed than for these than for exotic species; these ordinances remained unchanged in the years following Namibia's independence. In a review of South Africa's trade in African Grey Parrots, Mulliken (1995) noted that government inspections of private aviaries in South Africa were rare, and private aviculturists not required to maintain breeding records or to ring or otherwise mark captive-bred nestlings, and drew attention to problems with South Africa's reporting of the source of African Greys exported from that country.

CAPTIVE-BREEDING

The first instance of captive-breeding of *P. rueppellii* was probably that of Nelson (1974) in the USA. Low (1992) knew of few breeding successes. It was first bred in the UK in 1979, then by Manning (1982) and in London Zoo in 1981 and 1984. Maddock (1996, 1997, 1998) reported on the UK stud book results: in January 1996 there were 8 pairs but no young had been produced in the previous year; by January 1997 19 pairs had produced 16 young, and during the following year 21 pairs produced 15 young. However, Manning (1998) pointed out that the number of birds registered in the stud book was only a small proportion of the birds held in the country; he knew of another 28 young that had been bred in 1997. He explained that breeding from second and third generation captive-bred birds was proving to be quite easy. Manning (1996) and Moat (1996) also commented on how much easier it was to breed from captive-bred birds compared with from wild birds, Manning (1996) providing advice on breeding 'wild-caught captive birds' as well as 'captive-bred birds'. Manning (1999) stated that there were 23 pairs in the studbook, of which only 5 pairs had bred during the previous year, producing 19 young of which 16 survived to maturity, and once again noting that most of the birds bred in the UK (approximately 80%) were not being entered in the stud book.

Brickell (1985) described breeding the species in South Africa. With regard to Namibia, Gleuck (1994) commented that the species is 'not a free breeder in captivity' and that there are "very few ringed cage-bred birds available". Johansson (1998) reported that the species had only very recently been imported

into Denmark but, already, two pairs had bred three young; by October 1997 there were 9 pairs and 2 males in the country.

As noted above, the vast majority of birds in trade are reported as captive-bred, with a significant increase in reported exports from South Africa during the early to mid-1990s.

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Tauraco hartlaubi (Fischer and Reichenow 1884)

Hartlaub's Turaco
Turaco de Hartlaub
Touraco de Hartlaub

Order: CUCULIFORMES

Family: MUSOPHAGIDAE

SUMMARY

An East African bird species that has been described as fairly common everywhere in its range. Reported international trade during the two years 1995 and 1996 amounted to 1,110 birds, nearly all of Tanzanian origin. The export quotas set in those years were exceeded by the reported trade. It has been claimed that some populations in northern Tanzania appear to have suffered a significant impact as a consequence of indiscriminate trapping for export. Additional information on status and trapping levels is needed from Tanzania.

The species is recommended under Decision 10.79 for inclusion in category d (ii) (Tanzania only).

DISTRIBUTION AND POPULATION

Turner (1997) described it as fairly common everywhere within its range, and still locally abundant in many areas above 2000 m. Turner (*in litt.* to IUCN/SSC Trade Programme, 1999) estimated the global population as >20,000.

Kenya: Common in highland forest and nearby well wooded habitats, at 1,600-3,000 m, including the forest islands of Mts Kulal, Nyiru and Marsabit, the Ndoto Mountains, the Mathews Range, Mt Uruguess, the Chyulu Hills and the Taita Hills (Lewis and Pomeroy, 1989).

Tanzania: Occurs at Loliondo, Longido, Mt Meru and Mt Kilimanjaro, North and South Pares and W Usambaras (Britton, 1980; Fry *et al.*, 1988; Snow, 1978; Turner, 1997; Zimmermann *et al.*, 1996). Turner (1997) claimed that 'some populations in N Tanzania appear to have suffered a significant impact as a consequence of indiscriminate trapping for the bird-export-trade.' However, C. Mlingwa (*in litt.* to TRAFFIC East/Southern Africa, 1999) regarded it as generally common. Schmidl (1982) noted it in Serengeti National Park, as an accidental visitor to evergreen montane forest, and exceptionally recorded in riverine forest on the Grumeti River.

Uganda: Occurs on Mts Morongole, Moroto, Kadam, Debasien and Elgon (Turner, 1997).

HABITAT AND ECOLOGY

'Montane evergreen forest at 1500-3200 m; in C Kenya, also occurs in well-timbered suburban gardens around Nairobi and Nanyuki.' The food consists mainly of fruits and berries, particularly *Chaetacme*, *Elaeodendron*, *Euclea*, *Trema*, *Duranta*, *Rawsonia*, *Podocarpus*, *Teclea*, *Vitis* and *Olinea*; also eats the large poisonous fruits of *Acokanthera longiflora*. In Nairobi suburbs frequently feeds on exotic fruits such as *Cotoneaster*, while at other times will also take caterpillars, moths and beetles. Breeds April-December, with peaks coinciding with periods of high rainfall. There are usually two eggs, which are incubated for 16-18 days, and the young can fly after 28 days. (Brown and Britton, 1980; Turner, 1997; van Someren, 1956)

THREATS TO SURVIVAL AND DOMESTIC TRADE

Kenya: Domestic trade includes hunting of an unknown number of birds by local people on Mt Kenya, and possibly elsewhere, for the red flight feathers, which are in demand for making fishing flies (Bennun and Njoroge, in press). The single biggest threat is habitat destruction (L. Bennun *in litt.* to TRAFFIC East/Southern Africa, 1999).

Tanzania: Turner (*in litt.* to IUCN/SSC Trade Programme, 1999) noted that mortality rates during capture of this species are 'extremely high'. C. Mlingwa (*in litt.* to TRAFFIC East/Southern Africa, 1999) regarded forest loss as a major threat.

INTERNATIONAL TRADE

Gross international trade reported to CITES in 1995 and 1996 (the species was not listed in the appendices until 16 February 1995) totalled 1,110, mainly of Tanzanian origin and reported as wild

birds. Brazil reported the import of 90 birds from the Netherlands and Spain, which were reported as captive-bred in Tanzania. However, 40 of these were reported by the exporters as of wild origin.

The reported export figures for both 1995 and 1996 for Tanzania exceeded the quotas set for those years, although this may be because the figures are based on permits issued rather than actual trade. Airport customs data in Tanzania show the following export figures: 1995: 366, 1996: 125, and 1997: 344. Note that these figures also exceed the export quotas in 1995 and 1997.

The Tanzanian Government issued export licences for a minimum of 1300 birds in both 1992 and 1993 (Turner, 1996).

Gross exports of *Tauraco hartlaubi*

TERM UNIT CTRY 1995 1996 total average

LIV	BE	44	1	45	22.5
LIV	DE	2	6	8	4.0
LIV	ES	20	0	20	10.0
LIV	NL	53	22	75	37.5
LIV	SG	16	8	24	12.0
LIV	TZ	534	395	929	464.5
LIV	US	0	5	5	2.5
LIV	XX	4	0	4	2.0

673 437 1110 555.0

South African permit data show that 110 wild-caught birds of this species were imported from Tanzania from 1991-1994, with exports of 14 captive-bred birds in 1993 and 12 wild caught birds in 1994. In 1997, 51 wild caught birds were imported from Tanzania, with a further 20 in 1998. (TRAFFIC East/Southern Africa *in litt.* to TRAFFIC International, 1999).

Shipments of birds from Tanzania to Belgium were valued at US\$20-US\$25 per bird (TRAFFIC Europe *in litt.* to TRAFFIC International, 1999). Maximum retail prices in the UK increased from £90 in 1977 to £465 in 1987, and then decreased to £200 in 1995 (WCMC files).

CONSERVATION MEASURES

Kenya: The species is fully protected under the Wildlife (Conservation and Management) Act of 1976, as amended in 1989. (TRAFFIC East/Southern Africa *in litt.* to TRAFFIC International, 1999).

Tanzania: Under the Wildlife Conservation Act, 1974, the capture of live animals requires a valid Trapper's Card and a Permit to Capture Animals. All trophies must be registered with a Certificate of Registration and every trophy dealer must carry a valid Trophy Dealer's Licence (class 12 for live or stuffed birds). Exports of trophies must be accompanied with a Trophy Export Certificate. (TRAFFIC East/Southern Africa *in litt.* to TRAFFIC International, 1999).

Export quotas have been set as follows:

	1992	1994	1995	1996	1997	1998	1999
Quota	500	160	200	300	300	300	300
Source		Leader-Williams and Tibanyenda (1996)	CITES Notification No. 874	CITES Notification No. 916	CITES Notification No. 957	CITES Notification No. 1998/07	CITES Notification No. 1999/21

CAPTIVE BREEDING

Turner (1999) referred to large numbers held in zoos and aviaries in the Europe, North America, Mexico and the Far East, and that there had been considerable success with breeding.

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Tauraco persa (Linnaeus 1758)

Guinea Turaco
Turaco de Guinea
Touraco vert

Order: CUCULIFORMES

Family: MUSOPHAGIDAE

SUMMARY

A bird species that is widespread in West and Central Africa and is fairly common over much of its range.

Recorded international trade during the period 1991-1996 amounted to 1,585, mostly originating in Guinea, Ghana and Togo. It is unlikely that this level of trade will have adversely affected any populations.

The species is recommended under Decision 10.79 for inclusion in category d (iii).

DISTRIBUTION AND POPULATION

T. p. buffoni (Vieillot, 1819): Côte d'Ivoire, Gambia, Guinea, Guinea-Bissau, Liberia, Mali, Senegal, Sierra Leone

T. p. persa: Benin, W Cameroon, Côte d'Ivoire, Ghana, Nigeria, Togo

T. p. zenkeri (Reichenow, 1896): Angola, S Cameroon, Central African Republic, Congo, Democratic Republic of Congo, Equatorial Guinea, Gabon

Fairly common and widespread over much of its range, but no real information on numbers. No data on densities, but territories in Gabon normally c. 15 ha (Turner, 1997). Common in forest, locally so in thick woodland (Fry *et al.*, 1988). Population estimate >15,000 (D. Turner *in litt.* to IUCN/SSC Trade Programme, 1999).

Angola: On the coast from Marfim to Camarões and from Gabão to the north of the country, and also in Cabinda (Pinto, 1983).

Benin: Rare in the Bétérou area, Borgou Province (Claffey, 1995). Not rare in the gallery forest bordering the savanna in the north (Brunel, 1958).

Cameroon: Common in the Cameroon Forest and the galleries of the forest savanna mosaic district (Louette, 1981).

Central African Republic: Uncommon in Manovo-Gounda-Saint Floris National Park and in Lobaye Prefecture (Carroll, 1988).

Congo: In Odzala National Park it was found throughout all forest types, but was more local in thickets (Dowsett-Lemaire, 1997a); in Nouabalé-Ndoki National Park it was found almost throughout but in surprisingly small numbers (Dowsett-Lemaire, 1997b); in the Léfini Reserve, on the Téké Plateau it was common (Dowsett-Lemaire, 1997c); in the Kouilou basin it was common in coastal forests, but was progressively less frequent the further away from the coast, and in the Mayombe it was confined to a few areas of severely degraded forest near large villages (Dowsett-Lemaire and Dowsett, 1991).

Democratic Republic of the Congo: Recorded at Bobito and Boyagati in a restricted area in the north-west (Schouteden, 1962) and on the lower reaches of the Congo River east to about 15°E (Snow, 1978).

Côte d'Ivoire: Thiollay (1985) described it as common in all the dense forests and galleries north to 10°N.

Equatorial Guinea: Reichenow (1910) reported on several specimens collected from the Rio Benito. It has been reported from Bioko but Pérez del Val *et al.* (1997) showed that there was no proof that it occurred there.

Gabon: Abundant throughout forests in the north-east ; each territory covers 15 ha (Brosset and Erard, 1986).

Gambia: Gore (1990) described it as a scarce and local resident, apparently confined to the remaining small area of high forest in the Lower River at Abuko, Brikama, Pirang, Brufut, Tanji and Selety. It was present in Abuko Nature Reserve throughout the year and undoubtedly breeds there, but no nest had ever been found. Wachter (1993) referred to 106 further observations that supported Gore's assessment of status and added Sanyang, Gunjur and Kasa Kunda as new localities.

Ghana: Grimes (1987) described it as a not uncommon resident in mature and secondary forest, forest clearings, and well wooded savanna just north of the forest and south through the Volta Region to inselbergs on the Accra-Ho-Keta Plains and coastal thicket west of Accra. At Legon, numbers increased between 1960 and 1970 as trees matured and formed a closed canopy (Grimes, 1972). It has been collected at Axim, Sekondi, Cape Coast and was located at Kumasi and Sunyani. Lowe (1937) found it to be plentiful at Ejura and Mampong in Ashanti.

Guinea: It was found to be common in Gaoual department (Morel and Morel, 1988), and moderately common on the Kounounkan Massif (Hayman *et al.*, 1995). Oustalet (1879) referred to a specimen collected on the Loss Islands. Richards (1982) knew of only one record from the Conakry and Kakulima areas. Walsh (1987) saw only one near Beyla in several trips to the north-east in 1984-1985.

Guinea-Bissau:

Liberia: Gatter (1997) described it as a common resident in northern Nimba and Lofa Counties. It was also common in northern farmland-savanna-forest mosaics and secondary forests, with 3 pairs/0.5 km² at Wologizi. It reappeared in the Parinari forests of Mt. Nimba up to 1500 m, and on the ridges of the Wologizi range above 900 m. On the slopes and summits of the Nimba range up to 15 could be heard from one place in disturbed forest.

Mali: Two series of observations, of singles or groups of two or three birds, in the upper Bafing valley in June (Lamarche, 1980).

Nigeria: Elgood *et al.* (1994) described it as not uncommon, widespread in the forest zone in the canopies of high forest and secondary growth; also in montane gallery forest at the Obudu Plateau, with relict populations in the forested areas of southern slopes of the Jos Plateau west to near Kaduna (Anara F. R.) and frequent in the Gashaka-Gumti Nat. Park (Green 1990). Farmer (1979) found it in flocks of up to eight birds in the Ile-ife area. Mackenzie (1979) found it occasionally in riverine forest in the Calabar area. Marchant (1953) found it to be common and widespread in the south-east.

Senegal: Morel and Morel (1990) found that it was not uncommon, but with records only in forests south of the Gambia: near Oussouye, at Ziguinchor in Casamance, in The Niokola-Koba National Park, and in the Kédougou region.

Sierra Leone: Particularly abundant in gallery forests (Turner, 1997).

Togo: Cheka and Walsh (1996) described it as a common resident of gallery forest in well-wooded savanna and forest from the Aledjo forest southwards. However, Millet-Horsin (1923) noted it as very rare in lower Togo, so its status may have changed in recent years.

HABITAT AND ECOLOGY

Widespread in West African lowland and gallery forests; generally prefers areas of older secondary growth, particularly at the edges of cultivation and along rivers and other watercourses. Typically from sea-level to 1,100 m, but to 1,385 m in the Bamenda Highlands, Cameroon. It feeds on a wide variety of wild and cultivated fruits, and also on flowers and buds. Breeds in May-June and in August in Cameroon, in December-February and June-September in Gabon, and in June and October in Sierra Leone. There are generally two eggs, which are incubated for 21-23 days, and the young remain in the nest for 26-28 days. (Turner, 1997).

THREATS TO SURVIVAL AND DOMESTIC TRADE

D. Turner (*in litt.* to IUCN/SSC Trade Programme, 1999) claimed that the 1,585 birds reported in trade from 1991-1996 was 'having a serious affect on populations in Guinea, Liberia, Ghana and Togo' but provided no documentation to support this assertion.

INTERNATIONAL TRADE

Gross net international trade reported to CITES from 1991-1996 totalled 1,585, an annual average of 264. Most were reported as wild-caught birds and the main exporters were Guinea (41%), Ghana (25%) and Togo (21%). Only 14 birds were reported as captive-bred, and the source of 8 of these was reported differently by the importers and exporters. No trade of illegal origin was reported to CITES but 15 birds exported from Guinea to the Netherlands on 22 March 1994 were seized in transit in Belgium (TRAFFIC Europe *in litt.* to TRAFFIC International, 1999). A shipment of 10 birds exported from Guinea to Malta on 23 November 1996, and transiting through Belgium, were not apparently reported to CITES (TRAFFIC Europe *in litt.* to TRAFFIC International, 1999).

The maximum retail price in the UK was £300 in 1988 but dropped to £200 in 1992 (WCMC files).

Gross exports of *Tauraco persa*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	total	average
LIV		AT	0	4	0	0	0	0	4	0.7
LIV		BE	0	0	0	0	4	2	6	1.0
LIV		DE	0	0	0	0	0	2	2	0.3
LIV		GH	194	0	0	15	120	60	389	64.8
LIV		GN	124	124	55	192	117	30	642	107.0
LIV		ML	0	0	0	0	30	0	30	5.0
LIV		SG	0	0	0	0	134	32	166	27.7
LIV		TG	115	115	14	30	43	22	339	56.5
LIV		ZA	0	0	6	0	0	0	6	1.0
LIV		ZR	0	1	0	0	0	0	1	0.2
			433	244	75	237	448	148	1585	264.2

CONSERVATION MEASURES

Where unreferenced, information derived from *African Wildlife Laws*, IUCN Environmental Policy and Law, Occasional Paper No. 3.

Benin: Capture and export are subject to licence (S.I. No. 80-38, dated 11 February 1980). (Mulliken, 1995)

Cameroon: Capture and export are subject to licence (S.I. No. 83/170, dated 12 April 1983). (Mulliken, 1995)

Central African Republic: Capture and export of live birds are subject to licence (Acts No. 84-045, dated 27 July 1984; and 84-062, dated 9 October 1984). (Mulliken, 1995)

Congo: Capture and export of live birds subject to licence (S.I. 48-83, dated 21 April 1983; Act No. 49/83, dated 21 April 1983). (Mulliken, 1995)

Gabon: All capture and export is subject to licence (Loi d'orientation en matiere des eaux et des forets, dated 22 July 1982). (Mulliken, 1995)

Gambia: Fully protected.

Ghana: Capture and export of wild birds is subject to licence (Wildlife Conservation Regulations, L.I. No. 685, dated 4 March 1971; L.I. 1240, dated 15 May 1980; CITES Notification No. 231, dated 13 October 1982). Licences are issued to individuals, are non-transferrable, and specify the species and number of birds allowed to be obtained. The hunting and capture of all birds listed in Schedule 2 of the Wildlife Conservation Regulations is prohibited between 1 August and 1 December, and the hunting and capture of young and/or adults accompanied by young are prohibited at all times. A 'game and trophy export permit', granted by the Chief of the Ghanaian Wildlife Department, is required to export wild birds, as is an export licence from the Ministry of Trade for commercial exports. (Mulliken, 1995)

Guinea: Commercial trapping of wild birds is regulated under l'Ordonance No 007/PRG/SGG/90 of 15/2/90; Le Decret No 126/PRG/SGG/91 of 8/2/91; and L'Arrête No ???/MARA/?/91 of 9/7/91. (Mulliken, 1995).

Mali: Capture and export subject to licence (Ordonnance No. 4/CMLN, dated 25 January 1971). (Mulliken, 1995).

Nigeria: International trade prohibited since 20 April 1985 (CITES Notification No. 874).

Senegal: Commercial exports prohibited.

Togo: Capture and export subject to licence (Act No. 4, dated 16 January 1968; and S.I. No 80-171, dated 4 June 1980).

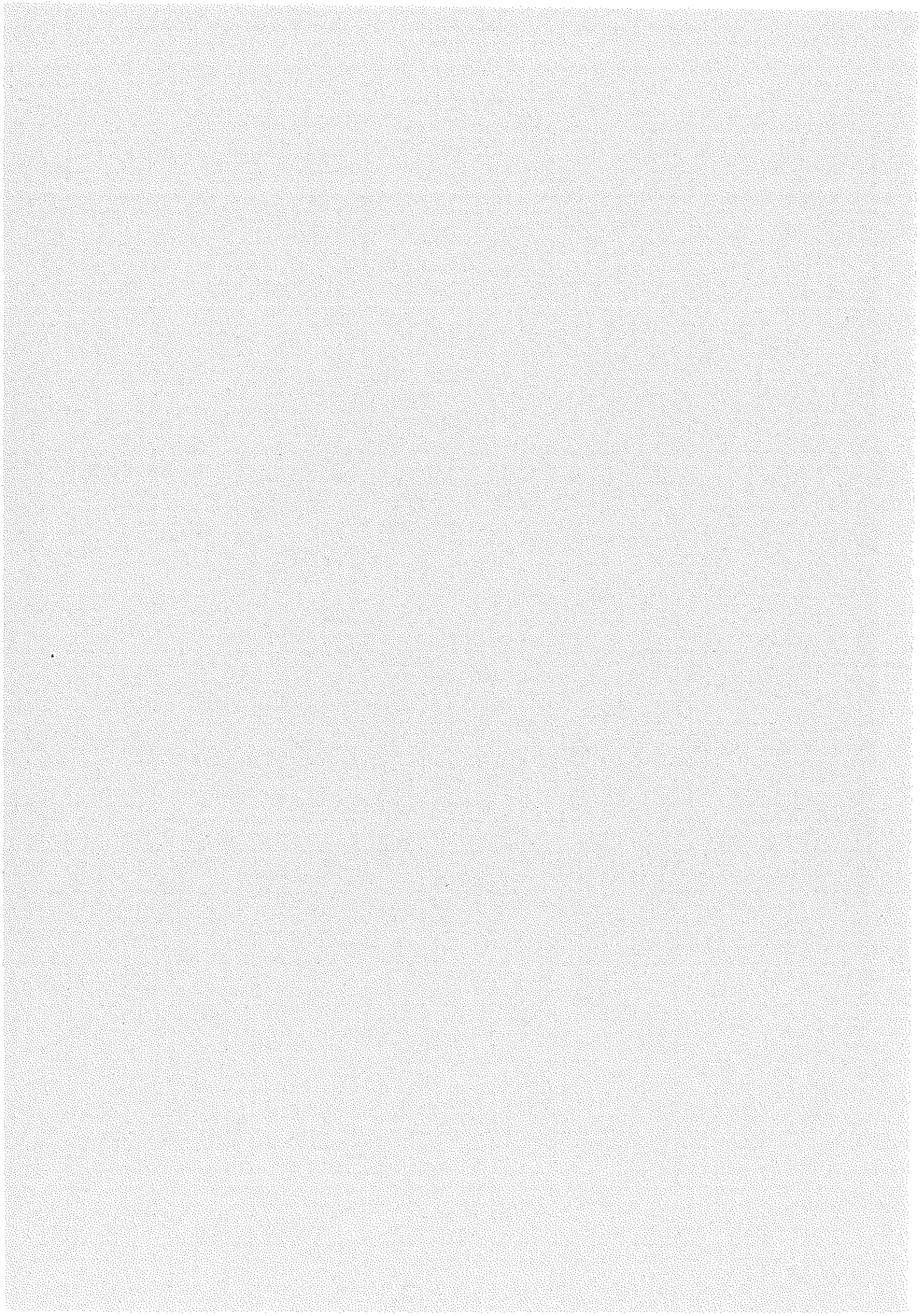
CAPTIVE BREEDING

Roles (1971) described breeding *T. p. persa* at Jersey Zoo-Park in 1970. Horne (1991) bred *T. p. buffoni* in 1990. According to D. Turner (*in litt.* to IUCN/SSC Trade Programme, 1999) large numbers (500+) are held in zoos and aviaries in Europe, North America and the Far East though, oddly little breeding success reported.

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Chamaeleo jacksonii Boulenger, 1896

Jackson's Three-horned Chameleon
Camaleón de Jackson
Caméléon de Jackson

Order: SAURIA

Family: CHAMAELEONIDAE

SUMMARY

A medium-sized chameleon from the highlands of Kenya and Tanzania also established as feral populations on several of the Hawaiian islands in the USA. Popular with collectors of reptiles, particularly in the USA. Until very recently most demand within the USA was reportedly met by individuals collected from populations in Hawaii, with some captive-breeding for commercial purposes also taking place; however export of specimens from Hawaii to the mainland USA has recently been banned. The species is widespread in Kenya from which negligible exports have been recorded in the period 1991-1996. In Tanzania the species is apparently confined to Mount Meru where at least part of its range lies within a protected area; extent of available habitat and population densities of the species are unknown. Nearly 14,000 have been reported as exported from Tanzania in the period 1991-1996 (although only 156 of these in 1996). The species has not been listed as a quota species by Tanzania in the period 1995-1998 and the legal status of recorded exports is unclear. Export from Kenya is clearly not a problem. Levels of export from Tanzania are unlikely to be a problem, however in the absence of population data this cannot be stated with complete certainty.

The species is recommended under Decision 10.79 for inclusion in category d (ii) (Tanzania only).

DISTRIBUTION & POPULATION

Inhabits highlands in Kenya and Tanzania; established as feral populations in Hawaii, USA.

Kenya: Occurs in the central highlands from Mount Kenya and the Aberdares south to Nairobi; also recorded from the eastern edge of the Rift Valley in central Kenya, and there is a thriving population in Nairobi National Park's forest area (Klaver and Böhme, 1997; Lin and Nelson, 1981; Loveridge, 1957; Mertens, 1966; Rand, 1958; Rotich, *in litt.* to TRAFFIC East/Southern Africa, 1999; Spawls and Duff-Mackay, 1995)..

Two subspecies are recognized in Kenya: *C. j. xantholophus* occurs on the southern, eastern and north-eastern faces of Mt Kenya; the remainder of the range is occupied by the nominate form (Eason *et al.*, 1988; Klaver and Böhme, 1997).

Overall population status unknown; the species was said to be abundant around Karatina in 1981 (Lin and Nelson, 1981).

Tanzania: Known from Mt Meru (as the form *C. j. merumontanus*), where it has been found at altitudes of ca 2300-2700 m (Rand, 1958). Broadley and Howell (1991) also report a record of a male *C. jacksoni* from Mondo, Usambara Mountains of uncertain subspecific status. They considered it may represent the typical form. This record represents a considerable southern and eastern extension of the species's known range.

[USA: The species became established in the Hawaiian islands, initially on Oahu, in the early 1970s when a consignment from Kenya was released on private property to acclimatise. Free-ranging populations, identified as the subspecies *C. j. xantholophus* (McKeown, 1991), are now reportedly established on Oahu, Maui, Hawaii and Kauai (Waring, 1998)].

Very few studies on population densities of chameleons in the wild have been carried out. A recent brief assessment in Ranomafana National Park in south-east Madagascar of population densities of six sympatric chameleon species (two *Brookesia* spp. and four *Calumna* spp.), both within forest and along paths cuts through forest, produced estimated population densities ranging from ~7 to ~40 individuals per hectare, with two species too rarely recorded to allow quantitative estimation (Jenkins *et al.*, 1999). Enormous care must be taken when extrapolating from these figures to other species in other habitats, but they may indicate that chameleon population densities of some tens of individuals per hectare are not unusual.

HABITAT AND ECOLOGY

A comparatively large chameleon, inhabiting highland areas up to 2700 m (Rand, 1958). Occurs primarily in forest and former forest, but also in coffee plantations where some original trees have been left standing, and in stands of ornamental or exotic trees, and in hedges in Nairobi (Hebrard, *in litt.*, 1986; Jenkins *in litt.*, 1999). Around Karatina *C. jacksonii* occurred predominantly in woodlands mixed with herbs and shrubs, particularly above 2 m, and rarely in thick undergrowth. Bushes were the principal perch site (Lin and Nelson, 1981). On Mt Meru, *C. j. merumontanus* was found in bushes and in low trees (Rand, 1958). The feral populations on Hawaii are often found in suburban areas, usually where there is luxuriant vegetation cover, although they are sometimes also found on isolated, sparsely-foliated shrubs and trees (Waring, 1998).

The species is ovoviviparous; the female gives birth some three months after mating (Waring, 1998). Under captive conditions, maturity can reportedly be reached in six months; in one captive colony, females produced up to 5 brood in a lifetime and ceased reproducing at 3-4 years, while males continued for some years after this. Average brood consisted of 29, with a maximum recorded of 51 (Masurat and Masurat, 1996). In a Kenyan study, females were found to mature at around 13.5 months and males 3 months later; average brood size in this population was around 22 animals (Lin and Nelson, 1981).

THREATS TO SURVIVAL

Kenya The species is widespread in Kenya and evidently adapts well to secondary habitats, including suburban areas (see above). There is no reason to consider it currently at risk of extinction in that country.

Tanzania The species evidently occupies a fairly small range, although much of it is within a game reserve (Sayer *et al.*, 1992). No estimates of the size of the Mount Meru population have been made, and it is therefore impossible to assess the impact of collection for export.

In Tanzania, the species is reported to be collected from high altitude sites in areas higher than coffee plantations (TRAFFIC East/Southern Africa, *in litt.*, 1999).

INTERNATIONAL TRADE

Summation of CITES records indicates that around 15,000 individuals of *C. jacksoni* were recorded in trade in the period 1991-1996. With the exception of 26 bodies all trade was in live specimens, evidently for the pet and reptile collector trade: Over 90% of recorded exports originated in Tanzania, the vast majority declared as of wild origin. Recorded exports from the other range state (Kenya) were negligible by comparison.

A review of live exports from Kenya for the period 1989-1997 indicates that a total of 114 were exported (one shipment of 2 in 1995, and two shipments in 1996 of 72 and 40 animals) (Ministry of Tourism and Wildlife Permit Data 1995; 1996). (Note some slight discrepancy with exports as registered on the WCMC CITES database of transactions registered in annual reports, summarised below, which indicate 4 exported in 1995 and 72 in 1996).

On 11 December 1997, a shipment of live reptiles exported illegally from Kenya, was confiscated upon arrival in Brussels, Belgium. This shipment contained 22 specimens of *Chamaeleo jacksonii* (Anon., 1998).

Reported exports from Tanzania peaked in 1994, at around 5500, declining to ca 3500 in 1995 and only 150 or so in 1996. One CITES permit was issued in 1997 for four wild specimens to be exported to South Africa. No CITES permits were issued in 1998 (TRAFFIC East/Southern Africa *in litt.*, 1999).

Gross exports of *Chamaeleo jacksonii*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	total	average
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BOD	TZ	0	0	26	0	0	0	26	4.3
LIV	AU	0	0	0	0	0	7	7	1.2
LIV	DE	0	0	2	0	2	0	4	0.7
LIV	DK	0	0	0	40	85	0	125	20.8
LIV	EG	20	0	0	0	0	0	20	3.3
LIV	ES	0	0	0	6	0	0	6	1.0
LIV	ID	0	0	0	0	8	0	8	1.3
LIV	KE	0	0	0	0	4	72	76	12.7
LIV	MG	0	4	0	0	0	0	4	0.7
LIV	MY	0	0	0	0	4	0	4	0.7
LIV	TZ	1241	399	3169	5519	3489	156	13973	2328.8
LIV	US	13	24	78	133	378	269	895	149.2

Chameleo jacksoni is a popular species with collectors, particularly in the USA. Reportedly the great majority of trade in this species in the USA has been in individuals collected from the introduced populations on the Hawaiian Islands (McKeown, 1999). No quantitative data are available on the trade in these within the USA. Most, if not all, of the just under 900 specimens reported as exported by the USA over the period 1991-1996 may comprise such individuals. Recent changes in Hawaiian State legislation, which have forbidden the shipping of this species to mainland USA (see below), may well increase demand for wild-collected specimens.

In 1996 Jackson's Chameleons from Hawaii were advertised in the USA for US\$65 each. In 1997 pairs were advertised by US dealers for US\$100-150 and captive-bred babies were offered for US\$18 each. In 1999, US dealers advertised captive-bred/born and imported Jackson's Chameleons in trade journals and via the internet for US\$65-75. A Dutch dealer offered *Cj. xantholophus* from Hawaii for NLG350 (US\$180) on the internet (TRAFFIC North America, *in litt.*, 1999).

Tanzanian Jackson's chameleons, of the subspecies *C. j. merumontanus*, are distinguished by dealers and collectors from individuals of Hawaiian origin, being referred to as "Dwarf Jackson's Chameleons", and are noted as being particularly colourful (Anon., 1999). At least one dealer was offering this form for sale via the internet in late 1998 for US\$100-125.

CONSERVATION MEASURES

Kenya The species is protected by Legal Notice 152, 1981, pursuant to the Wildlife (Conservation and Management) Act of 1976, as amended in 1989. Specifically, L.N. 152 confers the status of Game Animal to the Jackson's Chameleon, which means that a license is required to hunt or capture it. A certificate of ownership is required to possess any Game Animal. A separate permit is required to keep a live Game Animal in captivity. No Game Animal may be transferred by way of gift, sale or otherwise unless the person transferring the Game Animal endorses their certificate of ownership with the date of transfer and gives the certificate to the other person. Export of Game Animals is prohibited without an export permit.

The species occurs in at least one protected area (see distribution above) and doubtless occurs in a number of others.

See 'captive breeding' below for information on captive breeding within Kenya.

Tanzania The Wildlife Conservation Act, 1974, stipulates that the capture of live animals requires a valid *Trapper's Card* and a *Permit to Capture Animals* (fees vary depending on the species). There are also specific requirements for holding grounds. Any nesting reptile is classified as National Game and it is prohibited to hunt, kill, capture or wound such an animal without the written permission of the Director. In addition, all trophies must be registered with a *Certificate of Registration* and every trophy dealer must carry a valid *Trophy Dealer's Licence* (class 15 for live or stuffed reptiles). Exports of trophies must be accompanied by a *Trophy Export Certificate*.

As noted above, Mt Meru is a game reserve. It is not clear whether the *Chamaeleo jacksoni* recorded in trade in the period 1991-1996 were collected within the boundaries of the reserve or not and, if so, whether this was legal or not.

According to CITES Export Quota notifications for the relevant years the species has not been included in Tanzania's list of quota species for any of the years 1995-1998. It is unclear whether this means that there was no limit to the number of individuals that could be legally exported, or whether in fact legally no wild-collected individuals at all of the species should have been exported.

[USA Until 1998, Jackson's Chameleon was included in part B of Hawaii's Restricted Animal List. Species included in this list were allowed to be imported and possessed by private individuals, as well as by research institutions, zoos and others. Commercial trade was also allowed. A special possession permit issued by the Hawaii Department of Agriculture was required for these species (Levell, 1997). In addition, Hawaiian statute Hawaii; HRS 158-A stated that the species may be possessed only on the islands of Hawaii, Maui and Oahu. The movement of Jackson's Chameleon between islands was prohibited (Levell, 1997).

In February 1998, the Hawaiian Department of Land Resources promulgated rule changes to Chapter 13-124 of the Hawaii Administrative rules that made it illegal to possess or export from the state a number of animal species considered injurious, including *Chamaeleo jacksonii*.]

CAPTIVE BREEDING

The species is bred in captivity – in one case to nine generations over 15 years (Masurat and Masurat, 1996) – although as with most chameleon species, captive-breeding appears relatively difficult and labour-intensive. As noted above, captive-bred specimens are offered for sale (and around 400, most exported by the USA, have been recorded in CITES Annual Reports in the period 1991-1996), although it has been averred that specimens offered for sale in the USA as captive-bred are in many cases collected from the feral populations on Hawaii (Fry, 1996). It is not known if *C. j. merumontanus* is bred in captivity.

Kenya In 1994 the Kenya Wildlife Service approved the start-up of a Nairobi-based chameleon farm. This farm bred two species (*C. jacksonii* and *C. hoehneli*) and exported 40 specimens of *C. jacksonii* in 1996. The exports were reported as wild, not captive bred (Ngugi, 1996). This farm ceased operation in 1997. The Kenya Wildlife Service has informed TRAFFIC East/Southern Africa that there are no other operations involved in chameleon breeding in Kenya (TRAFFIC East/Southern Africa, *in litt.*, 1999). There is no record of captive bred chamaeleons ever being exported from Kenya.

Tanzania One operation is reportedly currently breeding chameleons; however it is not known whether this species is being produced (TRAFFIC East/Southern Africa *in litt.*, 1999). Twenty-five individuals reported by the USA as imported from Tanzania in 1995 were declared as captive-bred; Tanzania did not report the origin of any of the animals it exported in that year.

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Chamaeleo quadricornis Tornier, 1899

Four-horned Chameleon
Caméléon cuadricorne
Caméléon à quatre cornes

Order: SAURIA

Family: CHAMAELEONIDAE

SUMMARY

A small chameleon confined to highlands in western Cameroon and a small part of eastern Nigeria. No estimates of wild population levels have been located. No exports have been reported by Nigeria. Exported by Cameroon mainly to the USA for the live animal trade. Exports have risen from negligible levels in 1991-1993 to reach some 3500 in 1996. Levels of export from Cameroon are unlikely to be a problem, however in the absence of population data this cannot be stated with complete certainty.

The species is recommended under Decision 10.79 for inclusion in category d (ii) (Cameroon only).

DISTRIBUTION AND POPULATION

Records are confined to the western Cameroon highlands and the contiguous Obudu plateau in extreme eastern Nigeria (Böhme, 1975; Böhme and Klaver, 1981; Gartshore, 1986; Klaver and Böhme, 1992).

Cameroon The species has been recorded at a number of localities from Mount Kupe (4°48'N, 9°42'E), which is semi-isolated from the main highland block, northwards through Mount Manenguba (5°01'N, 9°51'E) and the Bamenda Highlands as far north as Mount Oku (6°12'N, 10°32'E), this being a linear distance of some 250 km (Böhme and Klaver, 1981; Gartshore, 1986; Stuart, 1986).

Nigeria Only known from the Obudu plateau near the border with Cameroon, lying around 150 km west-north-west of Mount Oku at 6°40'N, 9°20'E and forming the western extension of the western Cameroon highlands (Böhme, 1975; Böhme and Klaver, 1981).

Böhme and Klaver (1981) recognize two subspecies, *C. q. quadricornis* from Mount Manenguba and *C. q. gracilior* from the Bamenda Highlands to the north of Mount Manenguba. However, they noted that specimens from Mount Kupe and the Obudu plateau could not be assigned to either.

No information on population was located. Very few studies on population densities of chameleons in the wild have been carried out. A recent brief assessment in Ranomafana National Park in south-east Madagascar of population densities of six sympatric chameleon species (two *Brookesia* spp. and four *Calumna* spp.), both within forest and along paths cuts through forest, produced estimated population densities ranging from ~7 to ~40 individuals per hectare, with two species too rarely recorded to allow quantitative estimation (Jenkins *et al.*, 1999). Enormous care must be taken when extrapolating from these figures to other species in other habitats, but they may indicate that chameleon population densities of some tens of individuals per hectare are not unusual.

HABITAT AND ECOLOGY

A montane species; specimens have been collected at altitudes from around 1000 m (on Mount Kupe) to 2200 m (in the Bamenda Highlands) (Böhme and Klaver, 1981). Reported to inhabit montane gallery forest strips and the transition zone between forest and grassland (Gartshore, 1986).

Observations from captivity indicate a clutch size of 11-15 and an incubation period of 130-160 days (Paasch, 1994).

THREATS TO SURVIVAL

The highland area where the species occurs has high, and increasing, human population density and suffers from severe loss and degradation of natural habitats, particularly forests. Deforestation is caused by unsustainable exploitation for firewood and timber, overgrazing, agricultural encroachment

and fire damage. Deforestation is particularly serious in the Bamenda Highlands (where it is estimated that half the forest cover was lost between 1965 and 1985) and the Obudu plateau in Nigeria (Collar and Stuart, 1985; Sayer *et al.*, 1992; Stattersfield *et al.*, 1998). Extensive forest areas in the Bamenda Highlands are now only found on Mount Oku. However, in the absence of detailed information on the species's habitat requirements, it is not possible to say how serious an impact habitat conversion has on the species (Gartshore, 1986).

There is no information on local use or on the impact on wild populations of collection for export.

INTERNATIONAL TRADE

International trade in the species is first recorded in CITES annual report data for 1991. Virtually all trade (over 99%) is in live animals, evidently predominantly for the herpetological pet trade. At a low level (~ 100 animals annually) for the period 1991-1993, trade has since increased considerably, rising to some 1000 in 1994, 2000 in 1995 and 3500 in 1996. Virtually all this trade (~ 95%) is exports from Cameroon, the remainder being almost all (excepting three individuals in 1994) re-exports from the USA, most (~ 85%) of animals declared as originally wild-caught. The USA is also by far the most important importer, accounting for over 80% of recorded exports from Cameroon.

Gross exports of *Chamaeleo quadricornis*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	total	Average
BOD	CM		0	0	0	0	0	8	8	1.3
LIV	CM		60	174	50	1003	2095	3466	6848	1141.3
LIV	MA		0	0	0	3	0	0	3	0.5
LIV	US		0	0	0	100	198	95	393	65.5

The species is evidently currently considered attractive and highly desirable by hobbyists (Anon., 1999; Dix, 1998; Paasch, 1994). Reported retail prices in the USA are falling: Hoover (1998) recorded average prices (adjusted for inflation to 1997 levels) for wild-caught specimens of US\$122 in 1994, US\$88 in 1995 and US\$84 in 1996, while in 1998 the species was offered as wild caught specimens at US\$65 by one dealer and US\$75 by another.

CONSERVATION MEASURES

Cameroon Legal status unknown and no export quotas are recorded by CITES. There are active, internationally funded projects to conserve montane forests at Mount Oku (the Kilum-Ijim Mountain Forest Project) and Mount Kupe (Stattersfield *et al.*, 1998). Elsewhere within the species's range at least some forest is contained in gazetted forest reserves although enforcement of regulations was reported in the 1980s to be minimal or non-existent (Collar and Stuart, 1985).

CAPTIVE BREEDING

The species has been bred in captivity in Europe (Paasch, 1994) and the USA (Anon., 1999; Dix, 1998). Captive-bred specimens are on sale in the USA at prices similar to or slightly higher than those for wild-caught specimens (e.g. three-month-old specimens at US\$75, "adolescents" at \$85). There is no information on overall numbers of captive-bred specimens available commercially.

There is some disagreement over the ease with which the species can be maintained and bred in captivity. Some breeders and dealers maintain that the species is easy to keep (e.g. Dix, 1998), while others do not recommend it to novices (Anon., 1999). Overall, it seems that it requires specific conditions (notably low overall temperatures with marked diel variation and high overall humidity) different from those needed by other chameleon species. However, once these conditions are satisfied, it may apparently be considerably more tractable than many other species. In particular it seems that wild-caught specimens are much more likely to settle down and survive in captivity than is the case for most other chameleons (Dix, 1998).

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Calabaria reinhardtii (Schlegel 1848)

African Burrowing Python
Piton de Calabar
Calabare de Reinhardt

Order: SERPENTES

Family: BOIDAE

SUMMARY

While there is little known about this snake, the scattered distribution records available suggest that it is quite widespread in the forested areas of western Africa. The species is reported to have a high adaptability to altered habitats and is regularly encountered in farmed areas. Given the extensive range and secretive nature of *C. reinhardtii* it is presumed that large populations still exist and that international trade has little detrimental effect. From the limited information available the species is believed to be secure throughout most of its range, although further information on the status of wild *C. reinhardtii* in Togo and the Democratic Republic of the Congo, and ranching operations for this species in Togo would be desirable.

The species is recommended under Decision 10.79 for inclusion in category d) iii.

DISTRIBUTION AND POPULATION

Distributed in Western and Central Africa. Population estimates are unavailable. *C. reinhardtii* is secretive and is difficult to census. Populations appear to be more abundant in swamp forest habitats (L. Luiselli, *in litt.* to IUCN/SSC Trade Programme, 1999). Further population estimates and field studies are required throughout the range.

Benin: present (Roman, 1984).

Cameroon: reported present (Kluge, 1993).

Central African Republic: present (Joger, 1990).

Congo: recorded from Béna (4°03'S, 11°47'E) in the Kouilou River basin (Rasmussen, 1991).

Côte d'Ivoire: present (P.D. Rowley, *in litt.* to IUCN/SSC Trade Programme, 1999).

Democratic Republic of the Congo: Cansdale (1961) states that *C. reinhardtii* occurs in the Ituri forest. Kluge (1993) mentions that it occurs as far east as Lake Kivu.

Equatorial Guinea: reported present on Bioko (Kluge, 1993). Status in Río Muni is unknown.

Gabon: present (Kluge, 1993).

Ghana: recorded by Cansdale (1961) from near Oda. The results of a survey of *C. reinhardtii* in Ghana undertaken by the Wildlife Department in 1997/98 are currently being completed (E.L. Lamprey, *in litt.* to IUCN/SSC Trade Programme, 1999).

Liberia: present (Cansdale, 1961).

Nigeria: relatively widespread in south-eastern Nigeria; it has been recorded from Cross River State, Abia State, Akwa-Ibom State, Rivers State, and Bayelsa State. The species is reportedly less common in western Nigeria and is believed to be absent from central and northern Nigeria (L. Luiselli, *in litt.* to IUCN/SSC Trade Programme, 1999).

Sierra Leone: reported present by Welch (1982).

Togo: present (Anon., 1998), further details are required.

HABITAT AND ECOLOGY

In Nigeria this snake has been recorded from periodically flooded rainforest, secondary dryland forest, farmland, and suburban areas (Luiselli and Akani, 1998; Butler and Reid, 1986). In the Calabar area, *C. reinhardtii* has been found in farmed areas, near *Gmelina* plantations, and near the flood plains of the Great Kwa River (Butler and Reid, 1990). The adaptability of the species to altered habitats appears to be quite high (Luiselli and Akani, 1998). Diet consists mostly of small rodents and insectivores (Luiselli *et al.*, 1998). *C. reinhardtii* appears to be quite sedentary with little migration or dispersal occurring (L. Luiselli, *in litt.* to IUCN/SSC Trade Programme, 1999). There is little available information on reproduction. *C. reinhardtii* breeds annually; the female lays a clutch of between two and four eggs in the dry season. Period until hatching and the age of maturity are unknown. Maximum longevity is unknown (Luiselli and Akani, 1998).

THREATS TO SURVIVAL AND DOMESTIC USE

Destruction of rainforest by logging, mining and agriculture may have a pronounced effect on the long-term survival of *C. reinhardtii* (P.D. Rowley, *in litt.* to IUCN/SSC Trade Programme, 1999).

Ghana: there is reportedly no local use of this species (E.L. Lamptey, *in litt.* to IUCN/SSC Trade Programme, 1999).

Nigeria: occasionally killed for food by local people, and has been observed in the bush-meat markets of villages in the eastern Niger Delta region. Roadkills have been recorded, especially in suburbia and recently deforested areas (Akani *et al.* 1998). It is suspected that the impact of international trade on natural populations is currently not a significant threat to this species. This could change with the advent of long-term collecting programmes involving expert snake hunters, especially in the territories of Rivers and Bayelsa States (L. Luiselli, *in litt.* to IUCN/SSC Trade Programme, 1999).

The impact of introduced predators (such as cats, dogs and turkeys) is reported to be high in the Calabar Area. Predation is especially severe after hard rains or at night when *C. reinhardtii* are active above ground (L. Luiselli, *in litt.* to IUCN/SSC Trade Programme, 1999).

INTERNATIONAL TRADE

Most specimens of *C. reinhardtii* in trade between 1991 and 1996, (approximately 6,600 animals) were live, wild-caught individuals originating in Ghana and Togo. These animals were presumably destined for the herpetological pet trade. There appeared to be negligible trade in specimens other than live animals.

Gross exports of *C. reinhardtii* from Ghana fluctuated between 1991 and 1996; on average about 400 live animals were reported per year. Imports from Ghana recorded by importing countries exceeded the exports reported by Ghana for this period by ~100 animals.

Year	Exports reported by Ghana [†]	Imports reported from Ghana in CITES Annual Reports*
1991	348	406
1992	486	275
1993	100	174
1994	161	152
1995	333	410
1996	467	585
Total	1,895	2,002

[†] Ghana Wildlife Department (E.L. Lamptey, *in litt.* to IUCN/SSC Trade Programme, 1999).

* WCMC CITES database.

Gross exports from Togo declined substantially, from ~1,315 animals in 1991 to ~195 animals in 1996. During 1995 and 1996 imports from Togo recorded by importing countries exceeded the exports reported by Togo. Reported exports from Togo during 1995 and 1996 were well below the export quota of 800 animals set for both years (CITES Notification Nos. 874; 916). There were few animals exported from other range states (Benin ~120; Cameroon ~50) with the exception of the Democratic

Republic of the Congo from which a large number of live *C. reinhardtii* of undesignated source were reported as exports to the USA (1994, 200 animals; 1995, 1,000 animals).

Between 1991 and 1994 approximately half of the animals originating in Ghana were exported to Europe (principally Germany, Great Britain, and the Netherlands) and half to the USA. During 1995 and 1996 there appeared to be a substantial growth in imports of *C. reinhardtii* from Ghana to the USA; the quantity of Ghanaian animals imported into Europe during this period remained relatively stable. Over the period 1991 to 1996, the majority of animals that originated in Togo were imported by the USA (over 90% in each year). Most of the animals originating in Benin and Cameroon were exported to Western Europe; particularly France, Germany and Great Britain. The recorded export of 24 animals from Tonga during 1994 appears to be an error, it is likely that this record refers to animals originating in Togo. There were few recorded re-exports of *C. reinhardtii*.

During 1995 the USA reported the import of 10 animals of Mali origin (a non-range state) re-exported by Ghana. There are no records of this transaction by the Ghanaian Management Authority, and no re-export permits were issued (E.L. Lamptey, *in litt.* to IUCN/SSC Trade Programme, 1999).

A single illegal import of the species was reported. Three specimens from Cameroon were seized by the USA in 1991.

During 1998/1999 the average dealer price for *C. reinhardtii* advertised on the internet in the USA was US\$55 per animal, 'captive-hatched' specimens were offered for US\$150 to US\$200; over the same period the average price in the UK was £70 (US\$114) per animal, and in the Netherlands NLG300 (US\$153). Although there were no details as to the provenance of most specimens offered by dealers, some were advertised as 'captive-hatched from wild-collected eggs from the vicinity of Accra, Ghana' (Barker and Barker, 1998).

Gross exports of *Calabaria reinhardtii*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	Total	Average
LIV		BJ	0	0	12	96	11	0	119	19.8
LIV		CH	2	0	0	0	0	0	2	0.3
LIV		CM	0	0	0	4	1	48	53	8.8
LIV		GH	421	526	183	171	425	689	2415	402.5
LIV		IT	0	2	0	0	0	0	2	0.3
LIV		NL	5	0	0	0	0	0	5	0.8
LIV		TG	1314	368	230	354	292	194	2752	458.7
LIV		TO	0	0	0	24	0	0	24	4.0
LIV		US	2	0	4	26	2	17	51	8.5
LIV		ZR	0	0	0	200	1000	0	1200	200.0
SPE		CM	3	0	0	4	0	1	8	1.3
SPE		US	0	0	0	0	1	0	1	0.2

CONSERVATION MEASURES

Ghana: the report of a survey of *C. reinhardtii*, undertaken by the Wildlife Department in 1997/98, is being completed. This study forms part of the broader CITES Project No. CP/1200-96-02 and titled 'Survey of the Status and Management of *Python regius* in Ghana' which started in January, 1997 (E.L. Lamptey, *in litt.* to IUCN/SSC Trade Programme, 1999). Wildlife Conservation Regulations, 1971 L. I. 685 make it illegal to collect all species during the 'Close Season' of the 1st day of August to the 1st day of December. Exporters are allowed to export stocks held before the 'Close Season' (E.L. Lamptey, *in litt.* to IUCN/SSC Trade Programme, 1999). Gorzula *et al.* (1997) reports that the Bia National Park, the Ankasa and Nini-Suhein Reserve, and the Kakum and Assin Attandanso Reserve are believed to hold populations of *C. reinhardtii*.

Nigeria: no export of wildlife for commercial purposes permitted (CITES Notification No. 1998/36). Detailed field studies for *C. reinhardtii* and other snake species of Nigeria have been undertaken since 1996 (L. Luiselli, *in litt.* to IUCN/SSC Trade Programme, 1999).

Togo: export quota set at 800 *C. reinhardtii* for 1995, 1996 and 1997, and at 800 ranched specimens and 200 wild-taken specimens for 1998 (CITES Notification Nos. 874; 916; 994; 1998/36).

CAPTIVE BREEDING

There were very few records of declared captive-bred specimens in CITES Annual Reports between 1991 and 1996 (approximately 250 animals). The majority of these (~215) were reported as exports from Togo to the USA in 1993.

Ghana: there are reportedly no captive-breeding facilities for this species (E.L. Lamptey, *in litt.* to IUCN/SSC Trade Programme, 1999).

Nigeria: there are reportedly no captive-breeding facilities for this species (L. Luiselli, *in litt.* to IUCN/SSC Trade Programme, 1999).

Togo: CITES Annual Reports record the export of ~215 declared captive-bred specimens from Togo. Togo has python farms that rely on the collection of gravid females and the subsequent rearing of hatchlings from their eggs (Jenkins, 1997). The export quota for 1998 includes 800 ranched specimens (CITES Notification No. 1998/36).

De Buffrenil (1995) reported that *C. reinhardtii* is kept on farms in Benin, Ghana, and Togo; and that the production of young animals in captivity in significant numbers has not been realised. Individuals on the farms were reported to be wild-caught animals that are sold quickly, and animals used in breeding experiments.

There is little information on *C. reinhardtii* held in captivity. Bartlett (1998) reported that *C. reinhardtii* has been bred by several reptile hobbyists in the USA and UK. Animals advertised as captive-hatched are available from herpetological dealers (see Barker and Barker, 1998). Cansdale (1961) reported that a dozen live wild specimens that were sent immediately to zoos proved almost impossible to feed.

REMARKS

The systematic and taxonomic position of the genus *Calabaria* is in dispute. It is not clear whether *Calabaria* is a python or is more closely related to the boas (Kluge, 1993; L. Luiselli, *in litt.* to IUCN/SSC Trade Programme, 1999).

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Cordylus tropidosternum (Cope 1869)

East African Spiny-tailed Lizard
Cordyle de Cope

Order: SAURIA

Family: CORDYLIDAE

SUMMARY

This lizard species is found through much of eastern and southern Africa. *C. tropidosternum* is reported to occur singly under loose tree bark and is apparently difficult to collect in large numbers; further information is required on its specific habitat requirements. The species appears to have a low fecundity, further details on breeding biology are scarce. While large numbers of *C. tropidosternum* have been exported from Mozambique and Tanzania, with export quotas exceeded for both countries in 1995 and 1996, there is insufficient information available on wild population sizes from which to make general estimates of the impact of current international trade levels. It is possible that the greatest threat to the species is habitat loss through the removal of dry wood for use as firewood.

The species is recommended under Decision 10.79 for inclusion in category d) ii.

DISTRIBUTION AND POPULATION

Distributed in Eastern and Southern Africa. There are few data relating to populations of *C. tropidosternum*.

Botswana: distributed in eastern areas (Auerbach, 1987).

Ethiopia: present (Largen, 1993).

Kenya: found in rocky areas in coastal and southern Kenya (Spawls and Duff-Mackay, 1995), and has been recorded in Arabuko Sokoke Forest (Coast Province), Elangata Wuas in Kajiado District, and Ngong Hills, Nairobi. The population in Kenya appears to be secure, and a 1995 survey undertaken by the National Museums of Kenya revealed that the species was abundant in rock crevices in Kajiado District, and in tree hollows in Arabuko Sokoke Forest (D. Rotich, National Museums of Kenya, *in litt.* to TRAFFIC East/Southern Africa, 1999).

Malawi: present (Branch, 1994).

Mozambique: *C. t. tropidosternum* central Mozambique; *C. t. jonesii* southern Mozambique (Branch, 1994; Broadley, 1988).

South Africa: Transvaal lowveld (Branch, 1994). *C. tropidosternum* is reported to be common and widely-distributed in Kruger National Park (Branch and Braack, 1990), abundant in the Ndumu Game Reserve, and 'not uncommon' in Mkuzi Game Reserve (Bruton and Haacke, 1980).

Swaziland: limited distribution, known from only two localities, restricted to the lowveld region (Boycott, 1992). Recorded from Mlawula Nature Reserve (north-eastern Swaziland). Considered to be a 'regionally important species, rare in Swaziland or with a restricted distribution' (SNTC, 1999).

United Republic of Tanzania: present in the 'Zambezian' region (central and southern Tanzania) (Broadley and Howell, 1991).

Zambia: northern Zambia (Broadley, 1988).

Zimbabwe: *C. t. tropidosternum*, eastern Zimbabwe; *C. t. jonesii*, southwestern Zimbabwe (Broadley, 1988).

Two subspecies are recognised:

C. t. tropidosternum (Cope): is found in east Africa, reaching its southernmost limit in eastern Zimbabwe (Branch, 1994).

C. t. jonesi (Boulenger) occurs in the northern Transvaal (South Africa), eastern Botswana and south Mozambique (Branch, 1994).

C. angolensis (Bocage) of Angola, Namibia (north) and the Democratic Republic of the Congo (southern, Shaba Province) has previously been included in *C. tropidosternum*. It is now recognised as a distinct species and is excluded from this report (Anon. 1999; Broadley, 1988).

HABITAT AND ECOLOGY

Restricted to dry lowveld, particularly mopane savannah (Branch, 1994). Diet is formed of invertebrates, especially winged termites, moths and spiders (Auerbach, 1987; Branch, 1988). *C. tropidosternum* is closely associated with trees and logs, where it finds its way under the bark and into hollows; it is apparently very shy and secretive (Auerbach, 1987; Branch, 1994). A viviparous lizard, with usually two (but up to four) young born in midsummer (Auerbach, 1987).

THREATS TO SURVIVAL AND DOMESTIC USE

Switak (1995) reported generally that habitat destruction and over-collection for the pet trade were threatening *Cordylus* lizards.

Habitat loss may be the principal threat to *C. tropidosternum*; populations restricted to small, fragmented, coastal forests are of special concern. The removal of dead wood may affect the habitat of the species, this requires confirmation (K.M. Howell, *in litt.* to IUCN/SSC Trade Programme, 1999). There is little information on the impact of trade on *C. tropidosternum*.

Kenya: the species is not known to be exploited locally in Kenya or exported. The species could experience pressure if logging continues in the Arabuko Sokoke Forest (D. Rotich, National Museums of Kenya, *in litt.* to TRAFFIC East/Southern Africa, 1999).

Tanzania: K.M. Howell (*in litt.* to IUCN/SSC Trade Programme, 1999) reports that smuggling or mislabelling of specimens originating in Tanzania is possible, and that the existing quota system in Tanzania is not tightly controlled.

There appear to be no records of local use (Howell, K.M. *in litt.* to IUCN/SSC Trade Programme, 1999).

INTERNATIONAL TRADE

Trade of *C. tropidosternum* is almost entirely in live animals, presumably for the herpetological pet market. Around 37,000 animals were recorded in trade between 1991 and 1996. Tanzania exported by far the most *C. tropidosternum* (approximately 31,500 animals) all of which were presumed to be of wild origin. The majority of these animals were exported to the USA (74%) and Western Europe (19%). Gross exports from Tanzania grew from around 1,255 animals in 1991 to a peak of about 10,030 animals in 1994, and then declined to about 6,000 by 1996.

Comparison of export quotas set by Tanzania for 1995 and 1996, and exports from Tanzania as recorded in annual reports to CITES indicates that export quotas were apparently exceeded in each year.

Year	Export quota set by Tanzania	Gross reported exports from Tanzania*	Exports reported by Tanzania*	Imports reported in CITES Annual Reports*
1995	3100	4515	3838	4015
1996	5000	5997	5565	3889

* WCMC CITES database.

Tanzania issued 7413 CITES export permits in 1997, and 7033 permits in 1998. The set export quota is 5,000 animals for each of these years (CITES Notification Nos. 994; 1998/36).

Since 1993 there have been increasing exports of *C. tropidosternum* from Mozambique rising from 25 in 1993 to 1,320 in 1996. Approximately 2,665 of these were of wild origin and were mostly reported as exports to the USA (61%) and Western Europe (30%).

Comparison of export quotas set by Mozambique for 1995 and 1996, and exports from Mozambique as recorded in annual reports to CITES indicates that export quotas were apparently exceeded in each year.

Year	Export quota.set by Mozambique	Exports reported by Mozambique*
1995	500	1090
1996	1000	1320

* WCMC CITES database.

Between 1993 and 1995 it appears that over 1,900 wild *C. tropidosternum*, reported to be of Zimbabwean origin entered international trade. The majority of these animals were reported as imports into Germany (45%), Switzerland (44%), and the USA (11%). Only 490 of these animals were recorded in CITES annual reports as exports by Zimbabwe.

The only substantial re-exports of *C. tropidosternum* were from the USA (animals of Tanzanian origin), to Germany, the UK, China (Hong Kong), Denmark, Canada, and Japan. Re-exports from the USA reached a peak of ~385 animals in 1993 and had declined to none by 1996.

There were few incidents of illegal transactions reported. The only significant record of illegal trade was of 171 Tanzanian animals seized by the USA in 1993.

In 1998/99 specimens of *C. tropidosternum* of Tanzanian origin were advertised on the internet in the Netherlands at NLG 90 (US\$46) per animal.

Gross exports of *Cordylus tropidosternum*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	Total	Average
BOD		KE	0	0	0	0	14	0	14	2.3
BOD		ZW	0	0	1	0	0	0	1	0.2
LIV		AR	0	0	1	0	0	0	1	0.2
LIV		BE	0	0	0	0	20	0	20	3.3
LIV		DE	0	0	6	0	0	0	6	1.0
LIV		MZ	0	0	25	1270	1090	1320	3705	617.5
LIV		RU	0	0	0	0	50	0	50	8.3
LIV		TZ	1255	3045	6642	10034	4515	5997	31488	5248.0
LIV		US	0	59	386	106	90	0	641	106.8
LIV		ZW	0	0	865	950	100	0	1915	319.2
SPE	MLT	ZA	0	0	0	0	0	2	2	0.3

CONSERVATION MEASURES

Kenya: not legally protected (N.T. Marshall *in litt.* to TRAFFIC International, 1999a).

Mozambique: it appears that *C. tropidosternum* is not legally protected (N. Marshall *in litt.* to TRAFFIC International, 1999b). Mozambique set an export quota of 500 *C. tropidosternum* for 1995 and 1,000 for 1996, 1997, and 1998 (CITES Notification Nos. 874; 916; 994; 1998/36).

South Africa: protected by the following legislation (C. Patterson *in litt.* to TRAFFIC International, 1999):

Northern Cape Province, Eastern Cape Province, and Western Cape Provinces: 'Nature and Environmental Conservation Amendment Ordinance, 1978 (Ordinance 4 of 1978). Under this

Ordinance, all lizards are classed as 'Protected'. This provides for the prohibition, except under permit or the written permission of the land-owner, of the keeping, release, donation, possession - live or carcass, and the import or export of protected animals.

Gauteng and Mpumalanga Province, North West Province and Northern Province: Nature Conservation Ordinance 12 of 1983. Lizards are classified as 'Protected Game' under this Ordinance. This provides for the prohibition, except under permit or the written permission of the land-owner, the keeping, conveying, import or export, purchase, donation, picking up, removal, receipt, possession, acquisition or handling, or capturing of protected game.

Free State: Nature Conservation Ordinance 8 of 1969. The family Cordylidae is classified as Protected Game which prohibits, except under permit, the possession, sale or purchase, donation, conveyance, import and export of Protected game.

KwaZulu-Natal: unknown.

C. tropidosternum has been recorded in Kruger National Park, the Ndumu Game Reserve, and Mkuzi Game Reserve (Branch and Braack, 1990; Bruton and Haacke, 1980).

Swaziland: present in Mlawula Nature Reserve (north-eastern Swaziland) (SNTC, 1999).

Tanzania: under the Tanzanian Wildlife Conservation Act, 1974, the capture of live animals requires a valid *Trapper's Card* and a *Permit to Capture Animals* (fees vary depending on animal). There are also specific requirements for holding grounds. Any nesting reptile is classified as National Game and it is prohibited to hunt, kill, capture or wound such animal without the written permission of the Director. All trophies must be registered with a *Certificate of Registration* and every trophy dealer must carry a valid *Trophy Dealer's Licence* (class 15 for live or stuffed reptiles). Exports of trophies must be accompanied with a *Trophy Export Certificate* (TRAFFIC East Southern Africa *in litt.* to TRAFFIC International). Tanzania set an export quota of 3,100 *C. tropidosternum* for 1995. This was increased to 5,000 for 1996, 1997 and 1998 (CITES Notification Nos. 874; 916; 994; 1998/36).

Zimbabwe: according to the Parks and Wild Life (General) Regulations, 1990, no person shall keep, breed or produce reptiles for sale or for the purpose of selling any trophy therefrom unless he is the holder of a breeder's license (N.T. Marshall *in litt.* to TRAFFIC International, 1999b).

CAPTIVE BREEDING

Very few captive-bred *C. tropidosternum* were reported in international trade between 1991 and 1996. During 1993 Germany reported the import of 100 declared captive-bred animals as re-exports from the USA. Fifty of these animals originated in Tanzania, the remainder originated in Colombia (possibly mis-identified large lizards of South American origin).

Mozambique: during 1995 Mozambique reported the export of 490 ranched animals; 40 to Singapore and 450 to the USA.

C. tropidosternum has been bred in captivity by herpetological hobbyists (Anon., 1990). The viability of captive-bred stocks is unknown.

REMARKS

A much rarer species *Cordylus* species, *C. ukingensis* (Loveridge), is restricted to Mt. Ukinga area, Tanzania. It may possibly be traded as *C. tropidosternum* by design or ignorance (K.M. Howell, *in litt.* to IUCN/SSC Trade Programme, 1999).

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Corucia zebrata (Gray, 1885)

Prehensile-tailed Skink
Eslizón de las Islas Salomón
Scinque géant des Iles Salomons

Order: SAURIA

Family: SCINCIDAE

SUMMARY

A large, nocturnal, lizard species that is difficult to monitor in its lowland rainforest habitat of the Solomon Islands (a non-Party to CITES) and Bougainville and Buka (both of Papua New Guinea). There are believed to be approximately 5 to 6 animals per hectare of tropical rainforest; approximately 2.5 million hectares of available habitat remain in the Solomon Islands, this extrapolation suggests that considerable populations of *C. zebrata* may still exist. Given the low fecundity of the species it is possible that localised population declines may occur near human habitations where it is frequently collected. Virtually all exports of *C. zebrata* were from the Solomons, exports peaked in 1994 at over 5,000 animals. The annual export quota for this species set by the Solomon Ministry of Forestry, Environment and Conservation is regularly exceeded; the basis for this quota is unclear. It seems that overall population declines are unlikely at current trade levels.

The species is recommended under Decision 10.79 for inclusion in category d) iii.

DISTRIBUTION AND POPULATION

Solomon Islands: lowland rainforest of Choiseul, New Georgia, Isabel, Guadalcanal, Nggela, Malaita, San Cristobal, Ugi, Santa Ana, Shortlands (Anon., 1992).

Papua New Guinea: rainforest of Bougainville and Buka (Anon., 1992).

There are two subspecies recognised:

C. z. zebrata (Gray 1885): Solomon Islands: Choiseul, New Georgia, Isabel, Guadalcanal, Nggela, Malaita, San Cristobal, Ugi, Santa Ana, Shortlands; Papua New Guinea: Buka.

C. z. alfredschmidti Köhler 1997: Papua New Guinea: Bougainville.

Considered to be fairly common though not often seen, because of its nocturnal habits (McCoy, 1980; Parker, 1983). There are believed to be approximately 5 to 6 animals per hectare of tropical rainforest (F. Parker, *in litt.* to IUCN/SSC Trade Programme, 1999b).

HABITAT AND ECOLOGY

C. zebrata occurs in primary lowland rainforest, the preferred habitat being strangler fig trees *Ficus* sp. The species is almost entirely arboreal and nocturnal; it is slow moving and generally unable to travel or colonise new areas if the forest canopy has been broken (Anon. 1992; McCoy 1980; F. Parker *In litt.* to IUCN/SSC Trade Programme, 1999b). *C. zebrata* is completely herbivorous, feeding mostly on the leaves and fruit of an epiphytic *Sciandapsus* vine, a wild pepper vine *Piper* sp., and the leaves of the creeper *Epipremnum pinnatum* (Anon. 1992; McCoy 1980). There have been records of this species occurring in cultivated areas and derelict food gardens (Anon. 1992). The species is ovoviparous giving birth to one or two young after a gestation period of four to six months once or twice per year (Anon. 1992; Leary, 1990). Captive specimens reach maturity between the fourth and fifth year (Groves, 1994). Usually found in small groups from three to five animals; the males are highly territorial, there is no information on home range size (Anon., 1992). Longevity in captivity is reported to average seven and a half years (Groves, 1994).

THREATS TO SURVIVAL AND DOMESTIC USE

Solomon Islands: Leary (1990) reported that 'the low reproductive rate, preference for lowland tropical rainforest habitat, and use as a food item (of *C. zebrata*) by some Solomon Islanders, means that there is already considerable pressure on populations and the species is likely to be threatened by over-exploitation'. McCoy, in Anon. (1992) states that 'comparatively large numbers of skinks are being taken from relatively small areas. This situation, allied with the acknowledged large scale

destruction of lowland forest might well result in the eventual elimination of parochial populations of the animals'. In addition, Turner (1996) reports that expansive agricultural practices and rapid human population growth threaten *C. zebrata*. Hediger (1937) reported that 'on some of the Solomon Islands *C. zebrata* is considered to be a delicacy. The skinks as well as the large shell-less eggs of gravid females are eaten'.

INTERNATIONAL TRADE

The great majority of reported trade over the period 1992 to 1996 was in live wild animals (approximately 14,600 in total), presumably for the herpetological pet market. Virtually all *C. zebrata* reported in international trade originated in Solomon Islands; very few were reported to have originated in Papua New Guinea (50 in total).

Gross exports of *Corucia zebrata*

TERM	UNIT	CTRY	1992	1993	1994	1995	1996	Total	Average
LIV		DE	2	21	13	6	0	42	8.4
LIV		GB	0	0	0	4	0	4	0.8
LIV		ID	0	0	0	6	2	8	1.6
LIV		PG	0	0	50	0	0	50	10
LIV		SB	350	4404	5009	3094	1707	14564	2912.8
LIV		SG	0	0	0	0	2	2	0.4
LIV		US	15	92	301	258	313	979	195.8
LIV		XX	0	0	100	0	0	100	20
SKI		SB	0	100	0	0	0	100	20

Analysis of import data of *Corucia zebrata* from various countries importing from the Solomon Islands revealed that, with the exception of 1992, specimens exported 1992 to 1996 greatly exceeded the export quota of 1000 specimens per annum established by the Solomons Ministry of Forestry, Environment and Conservation (Turner, 1996).

Year	Export quota set by the Solomons	Recorded imports from the Solomons*
1992	1000	350
1993	1000	4404
1994	1000	5009
1995	1000	3094
1996	1000	1707

* WCMC CITES database.

The Solomon Islands Division of Environment and Conservation reported the export of 3,540 animals during 1996 (Turner, 1996). This is significantly higher than the number of specimens recorded by importing countries in CITES annual reports.

No exports of the species were reported by Papua New Guinea.

The vast majority of specimens in trade between 1992 and 1996 were recorded as imports by the USA; approximately 90% of recorded imports in 1993, 80% in 1994, 75% in 1995, and around 95% in 1996, with small numbers exported from the Solomon Islands to Western Europe and Japan. An increasing percentage of specimens imported by the USA between 1994 and 1996 appear to have been re-exported to Canada, Western Europe and Asia (8% in 1994, 11% in 1995, 19% in 1996). CITES reported trade in *C. zebrata* peaked in 1994 when over 5,000 specimens were recorded in CITES annual reports. During 1994 the USA reported an import of 50 live animals from Papua New Guinea.

Balsai (1997) reported that *C. zebrata* had become a high demand vivarium pet. The species was not regularly available in the USA herpetological trade until the 1980s. The substantial decline in price per animal between 1984 (US\$1,178) and 1996 (US\$133) is attributed to increased market availability

(Hoover, 1998). Average market prices for *C. zebrata* in the USA between 1992 and 1996 remained fairly constant indicating, perhaps, little change in supply or demand. In 1998/1999 the average dealer price advertised on the internet in the UK was £80 (US\$130) per animal (trade price only); over the same period the average retail price in the Netherlands was NLG250 (US\$127) per animal.

CONSERVATION MEASURES

Papua New Guinea: protected by the International Trade (Fauna and Flora) Act (Chapter 391) 1983 (J. Veal *in litt.* to TRAFFIC International, 1999).

Solomon Islands: The Solomon Islands are not a CITES signatory. The annual export quota set by the Solomon Islands for this species is 1,000 animals. This is significantly lower than the recommendation of Leary (1990), that the number of wild caught individuals in the Solomon Islands should be limited to 3,000 per year. As there appear to have been no recent population estimates made for this species (TRAFFIC Oceania *in litt.* to TRAFFIC International, 1999), it is unclear as to what information Leary (1990) used to make this recommendation. F. Parker (*In litt.* to IUCN/SSC Trade Programme, 1999a), recommends that further research into the trade is warranted because of the large numbers of animals involved, and the ease with which a population may be depleted.

The Solomons government has restricted the export dealer licences to Solomon Islanders; in 1996 there appeared to be four registered exporters of *C. zebrata* (Turner, 1996).

Legislation to further regulate wildlife trade in the Solomon Islands has been prepared but has yet to be passed by Parliament (TRAFFIC Oceania *in litt.* to TRAFFIC International, 1999).

CAPTIVE BREEDING

According to Balsai (1997), the species adjusts to suitable captive conditions easily and is known to breed fairly readily in captivity.

Virtually all specimens of *C. zebrata* reported in international trade were of wild origin; Leary (1991) reported that all reptiles exported from the Solomon Islands were of wild origin. There are no known captive-breeding programmes for the species, although Leary (1990) stated that '*C. zebrata* is known to breed readily in captivity, and captive-breeding should be encouraged'.

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Geochelone pardalis (Bell 1828)

Leopard Tortoise
Tortua leopardo
Tortue-leopard du Cap

Order: TESTUDINES

Family: TESTUDINIDAE

SUMMARY

This large tortoise is generally distributed throughout the savanna of southern and eastern Africa. Although there remains little information on population status, the species appears to occur in sizeable numbers and is found within several protected areas. In many areas *G. pardalis* is used as subsistence food and for medicinal purposes; it is less abundant in areas of high human density. During the period 1991 to 1996 the majority of specimens recorded in international trade are reported to have originated in Tanzania and Mozambique, with significant exports ALSO reported from the Democratic Republic of the Congo, South Africa, Zambia, and Burundi. Ranching operations have been initiated for *G. pardalis* in Tanzania and are reported to occur in Mozambique. While the species appears to be relatively secure throughout much of its range further information on population status and national distribution in Mozambique, Burundi, Zambia, and the Democratic Republic of the Congo, in addition to details about ranching operations in Mozambique is required to assess sustainability of exports.

The species is recommended under Decision 10.79 for inclusion in category d) ii.

DISTRIBUTION AND POPULATION

Generally distributed throughout the savanna of southern and eastern Africa. Very little information on population status is available. *G. pardalis* is difficult to census during the dry season when it shelters under felled trees, shrubs, thickets and other cover (Hailey and Coulson, 1995; K. Howell, *in litt.* to IUCN/SSC Trade Programme, 1999). The species is used as a food source over much of the range and is often rarer in densely human populated areas.

Angola: present in southwestern areas (Iverson, 1992).

Botswana: present throughout (Auerbach, 1987).

Democratic Republic of the Congo: appears to be present (J.N. Kundaali *in litt.* to CITES Management Authority of Zaïre, 1996). Neither Iverson (1992) nor Broadley (1989) give any indication of the species occurring in this country. A. Hailey (*in litt.* to IUCN/SSC Trade Programme, 1999) states that the Democratic Republic of the Congo is outside the known range of *G. pardalis*. Further distribution details are required.

Djibouti: present (Lambert, 1995).

Ethiopia: southern and central areas (Iverson, 1992).

Kenya: distributed in western and southern parts (Iverson, 1992). Details of the population in Kenya are not known, as no surveys have been undertaken (D. Rotich, *in litt.* to TRAFFIC East/Southern Africa, 1999).

Malawi: present (Iverson, 1992; Marshall, 1998).

Mozambique: mostly southern and central regions (Iverson, 1992).

Namibia: throughout Namibia but generally avoiding the Namib Desert; however this species occasionally enters the Namib along westward flowing river courses. No population estimates are available, but where the species is not harvested for food it is usually abundant (M. Griffin *in litt.* to Ministry of Environment and Tourism, Republic of Namibia, 1999). Provisional conservation status of *G. pardalis* is 'Vulnerable' (M. Griffin *in litt.* to Ministry of Environment and Tourism, Republic of Namibia, 1999).

Somalia: southern and northern regions (Iverson, 1992). Reported as 'not uncommon' around Hargeisa (9°33'N, 44°03'E) (Lambert, 1995); common around Tug Wajalè (9°37'N, 43°19'E) (Gibbs, 1988); and numerous north of Mogadishu (Gans, 1965).

South Africa: reportedly very common in eastern Cape Province and the Transvaal lowveld, but scarce elsewhere (Branch and Brack, 1987).

Sudan: southern regions (Iverson, 1992).

Swaziland: middleveld, lowveld and Lubombo regions. Absent from the highveld (Boycott, 1992).

Tanzania: observations reported by Moll *et al.* (1993) indicate that the species is very abundant over large areas of Tanzania. A large population exists within the Serengeti National Park, northeast Tanzania (Lambert *et al.*, 1998). Nationally categorised as 'near threatened' (Kabigumila, 1998).

Uganda: widely distributed in northern and eastern regions (Iverson, 1992).

Zambia: reported by Wilson (1968) to be widespread and common throughout the country, but absent on the Nyika Plateau. Information on current status is desired.

Zimbabwe: found over most of the country (Hailey and Coulson, 1995).

The presence of *G. pardalis* in **Burundi** is unclear. Neither Iverson (1992) nor Broadley (1989) give any indication of the species occurring in this country. A. Hailey (*in litt* to IUCN/SSC Trade Programme, 1999) states that Burundi is outside the known range of *G. pardalis*. CITES Annual Reports from Burundi indicate that exports of wild animals of Burundi origin took place between 1991 and 1996. It is possible that *G. pardalis* is present but has not been recorded. Further confirmation is required.

Two subspecies are recognised:

G. p. pardalis (Bell): restricted to the central and southern Cape Province and the southwestern Orange Free State, South Africa. Relict populations in Namibia (Broadley, 1989).

G. p. babcocki Loveridge: ranges from southern Sudan and southern Ethiopia south to Namibia, the northern Cape Province, western Orange Free State and northern Natal (Broadley, 1989).

HABITATS AND ECOLOGY

One of the largest mainland tortoise species, *G. pardalis* generally occurs in savanna, open woodland, and grassy habitats. Broadley (1989) stated that *G. pardalis* 'occupies a wide range of habitats, from semi-desert bushy Karoo-Namib shrubland (annual rainfall below 100 mm) to woodlands and savannas of the highland Sourveld (annual rainfall of up to 1,400 mm) in the Amatola Mountains of the eastern Cape Province'. Hailey and Coulson (1995) recorded *G. pardalis* in miombo woodland, mopane woodland/scrub, grassland, and open riverine vegetation (*Acacia tortilis* open woodland and riparian grassland). The sensitivity of *G. pardalis* to cold winters apparently excludes them from the central Karoo and high altitude grasslands. Felled trees, shrubs, and rocky outcrops are used as refuges, especially during the dry season (Broadley, 1989; Hailey and Coulson, 1995; Milton, 1992). *G. pardalis* is diurnal, and feeds on succulents, grasses, herbs and other vegetation (Broadley, 1989; Hailey and Coulson, 1995). Home range sizes of between 12 and 160 ha have been reported (Hailey and Coulson, 1995). The male:female sex ratio in Serengeti National Park, Tanzania, was reported to be 1:1.9 (Lambert *et al.* 1998). When breeding the gravid female excavates a flask-shaped hole in an open area, a clutch of between 5 to 18 large eggs (5-14 for *G. p. babcocki*) are laid and the nest is covered by soil and camouflaged with sticks and leaves. Eggs of the typical form take from eight to 18 months to hatch; eggs of *G. p. babcocki* are smaller, and have a shorter incubation time of 6 to 13 months (Broadley, 1989). Sexual maturity is probably reached at 15 years (Branch, 1988). A longevity of up to 75 years has been reported for captive specimens (Pritchard, 1979).

THREATS TO SURVIVAL AND DOMESTIC USE

Eaten by people throughout its range and usually rare in densely populated areas (Broadley, 1989).

Many tortoises are destroyed in bush fires, and in areas of frequent burning average tortoise size is smaller (Broadley, 1989; Lambert *et al.* 1998).

G. pardalis has a large home range. Jackal-proof fencing may restrict movements, and electric fences can cause mortality (M. Griffin *in litt.* to Ministry of Environment and Tourism, Republic of Namibia, 1999; A. Hailey *in litt.* to IUCN/SSC Trade Programme, 1999).

Adult *G. pardalis* are sometimes killed by farmers who believe that they compete with livestock (Malan and Branch, 1992).

Parts of *G. pardalis* are reported to be used in the traditional medicines of Kenya, Namibia, and Malawi. International medicinal trade in *G. pardalis* has not been recorded (Marshall, 1998).

G. pardalis is one of the most popular pet tortoises in South Africa (Malan and Branch, 1992).

Namibia: genetic pollution is considered a problem (both subspecies are present). Live animals are regularly transported between domestic gardens, other urban centres and "farms". Some protected areas have traditionally been used as dumping grounds for confiscated/orphaned animals, so genetic integrity has been disrupted throughout Namibia (M. Griffin *in litt.* to Ministry of Environment and Tourism, Republic of Namibia, 1999).

Tanzania: Kabigumila (1998) commented that the resumption of uncontrolled trade (i.e. at pre-1992 levels) may deplete easily accessible populations of tortoises, and may also lead to the depletion of previously unexploited populations.

INTERNATIONAL TRADE

Reported international trade was principally in live animals, presumably for the herpetological pet trade. Between 1991 and 1996 approximately 31,000 animals were recorded in trade, virtually all of these were wild caught animals reported to have originated in Benin, the Democratic Republic of the Congo, Mozambique, South Africa, Tanzania, and Zambia. Negligible quantities of products other than live animals were traded (total of 73 items). Overall trade in *G. pardalis* was lower in 1992 than in 1991 as exports of wild animals from Tanzania were restricted (see Conservation Measures). The number of *G. pardalis* reported in trade rose sharply from 1993 as exports from Mozambique steadily increased and were joined by substantial exports from Zambia and Democratic Republic of the Congo

Exports of wild *G. pardalis* from Tanzania were suspended in 1993 by the Tanzanian Management Authority. Most *G. pardalis* recorded as exports in Tanzania's CITES Annual Reports after 1992 were declared ranched and were mainly exported to Japan during 1995 (~1,050 animals reported as exports to Japan by Mozambique, 550 animals reported as imports from Mozambique by Japan). Tanzania set no export quotas for *G. pardalis* between 1991 and 1996.

Mozambique showed a steady increase in exports from approximately 100 animals in 1991 to 6,750 in 1996. Almost all animals exported were wild caught (90%). Although Mozambique set an export quota of 3,000 *G. pardalis* (presumed wild origin) for 1995 (CITES Notification No. 874), this was exceeded by ~1,200 animals (3,250 wild animals, and 950 ranched animals, were recorded as exports in Mozambique's 1995 CITES Annual Report). The export quota of 10,000 for 1996 (wild and ranched animals) was not realised (reported exports: 5,500 wild, 700 captive-bred, 350 ranched) (CITES Notification No. 916).

South Africa exports peaked in 1993 when ~800 animals (mostly of wild origin) were reported. Exports fell substantially after 1993 with only 20 animals (all captive-bred) reported in 1996. Between 1991 and 1996 most specimens recorded in trade were exported to Europe (48%) (principally to Italy, Germany, and the Netherlands). Substantial quantities of animals were also exported to the USA (43%) and Japan (9%).

During the mid-1990s, Transvaal Province restricted exports of native tortoises to specimens that had been confiscated and provided to one of two zoos. Export permits were issued to a single trader for the export of over 2000 native tortoises during 1993 and 1994, the majority of which were *G. pardalis*.

This figure was much higher than the number of confiscated specimens recorded as sold to this exporter (425), however, calling into question the origin of the remaining tortoises. In 1994, this species was selling on international markets at the Rand equivalent of ZAR4,154 (March 1994 = US\$ 1,200) to ZAR7,982 (US\$ 2,320). At that time, confiscated specimens were available for purchase from zoos for ZAR50 (US\$ 15), the cost of obtaining wild-collected animals likely to have been even less, providing an incentive for export of specimens incorrectly identified as confiscated (Bodasing and Mulliken 1996).

There were no exports reported from the Democratic Republic of the Congo prior to 1995. In 1995 and 1996 a total of about 2,650 wild animals were reported as gross exports. Most of these were reported as exports to the USA (87%).

The presence of *G. pardalis* in Burundi is unconfirmed (see Distribution). Between 1991 and 1993 approximately 1,150 *G. pardalis* were reported as of Burundi origin. The Management Authority of Burundi stopped any export for commercial purposes of reptile species from November 1992 (CITES Notification No. 705) (see Conservation Measures). However approximately 100 *G. pardalis* were recorded as exports in Burundi's 1993 CITES Annual Report. The export suspension was rescinded in August 1994 (CITES Notification No. 817), and 50 animals were reported as imports by Switzerland in 1996. All animals were of wild origin.

Zambia exported animals in 1995 and 1996 (~1,100 total) most of which went to the USA. All animals were believed to be of wild origin. Approximately 500 wild animals of Sudanese origin were reported as imports by Egypt in 1992. There were negligible recorded exports from other range states.

For the past several years, Kenya has approved some exports of wild caught *G. pardalis*, under the Wildlife Utilization Programme of the Kenya Wildlife Service. This programme commenced in 1992 and was aimed at encouraging ranching and farming of wildlife. One farm is currently in operation in Kenya which produces *G. pardalis*. As specimens have not reached the F2 level they do not conform with CITES requirements to be labelled as captive bred, and are more accurately described as ranches, although the tortoises are labelled as wild caught on export permits (A. Jama *in litt.* to TRAFFIC East/Southern Africa, 1999). Permits were issued for the export of 151 Leopard tortoises in 1996, 644 Leopard tortoises in 1997 (Ministry of Tourism and Wildlife permit data), and 38 Leopard tortoises in 1998. No permits have been issued in 1999 (as of 5 March 1999) (A. Jama *in litt.* to TRAFFIC East/Southern Africa, 1999).

Between 1991 and 1996 the USA consistently imported the most wild caught *G. pardalis* from range-states. In 1991 and 1992 the majority of these animals were of Tanzanian origin, but following the Tanzanian export ban Mozambique became the major source. With the restriction in exports from Tanzania the number of animals imported by the USA fell from just under 5,000 in 1991 to less than 1,000 in 1993. After 1993 the increase in exports from Mozambique and the Democratic Republic of the Congo saw the number of wild animals imported by the USA rise to just under 3,500 animals by 1996.

Europe was the second largest market for wild *G. pardalis* exported by range states. The majority of these animals reportedly originated in Burundi, Mozambique, and South Africa and were mostly imported by Denmark, France, Germany, Italy, the Netherlands, Switzerland, and the UK. With the reduction in animals exported from Burundi imports from range states fell, South Africa became the major source of animals. From 1994 Mozambique became the main supplier of wild caught *G. pardalis* to Europe (1995, ~1,040 animals exported; 1996, ~880).

Direct imports of wild caught animals into Japan remained low (around 250 animals annually) until 1995 when substantial numbers of animals were reported as exports to Japan from Mozambique (1995, ~400 animals; 1996, ~2,800).

Between 1991 and 1996 approximately 1,700 *G. pardalis* of wild origin were reported as re-exports to Japan from the USA; most of these animals originated in Tanzania and Mozambique. A much smaller number of wild *G. pardalis* were re-exported from the USA to Europe. There were few significant re-exports of *G. pardalis* from Europe. The most noteworthy was a single shipment of 90 South African animals from Germany to Japan.

Trade records suggest that the majority of *G. pardalis* imported by Egypt from Sudan during 1992 were re-exported to Europe and the USA. In 1996 Egypt re-exported approximately 270 *G. pardalis* of Mozambique origin to Japan, Mexico, and the Netherlands. There were no reported imports by Egypt of *G. pardalis* from Mozambique between 1991 and 1996. In 1992 the United Arab Emirates reported the re-export of 300 *G. pardalis* (mostly of Tanzanian origin with no source information) to Japan. Only 100 of these animals were reported as imports by Japan; they were also declared upon import to be of captive-bred origin.

The average dealer price for *G. pardalis* advertised in the USA remained relatively stable between 1991 and 1996 at approximately US\$180 per animal (Hoover, 1998). Dealer prices in Germany advertised on the internet in March 1999 were DEM 450-650 (US\$253-365) per animal. In the Netherlands prices advertised were NLG 450-715 (US\$224-357). Price per animal depends greatly upon its size.

Records of illegal trade in CITES Annual Reports were few and mostly confined to quantities of less than 10 animals. The exception to this was the seizure of 146 animals of Tanzanian origin in transit from the Netherlands to Tanzania during 1992. The transaction was reportedly for reintroduction purposes.

Gross exports of *Geochelone pardalis*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	total	average
BOD		CA	0	0	0	1	0	0	1	0.2
BOD		TZ	0	0	0	0	1	0	1	0.2
BOD		ZA	0	10	1	10	0	0	21	3.5
CAR		BW	0	0	0	0	0	1	1	0.2
CAR		ZA	1	0	0	0	0	0	1	0.2
EGG		TZ	2	0	0	0	0	0	2	0.3
LIV		AE	0	300	220	0	0	0	520	86.7
LIV		AO	0	17	0	0	0	0	17	2.8
LIV		AR	0	1	0	0	0	0	1	0.2
LIV		BI	1037	320	100	0	0	50	1507	251.2
LIV		BW	0	0	50	30	0	0	80	13.3
LIV		CA	1	0	0	0	2	0	3	0.5
LIV		CH	13	0	0	56	53	3	125	20.8
LIV		CL	0	1	0	0	0	0	1	0.2
LIV		DE	0	7	95	0	0	0	102	17.0
LIV		EG	0	358	0	0	0	270	628	104.7
LIV		ES	0	1	0	4	0	0	5	0.8
LIV		FR	0	0	0	0	0	15	15	2.5
LIV		GB	0	0	0	0	0	10	10	1.7
LIV		ID	0	0	0	0	0	4	4	0.7
LIV		IT	16	8	0	9	0	0	33	5.5
LIV		JP	0	6	0	0	2	0	8	1.3
LIV		MZ	100	133	945	2311	4390	6751	14630	2438.3
LIV		NA	0	4	3	0	0	2	9	1.5
LIV		NL	0	146	0	2	0	0	148	24.7
LIV		NZ	0	0	0	0	7	0	7	1.2
LIV		SD	0	500	0	0	0	0	500	83.3
LIV		SE	1	1	1	1	0	0	4	0.7
LIV		SG	0	0	10	10	0	4	24	4.0
LIV		TZ	5157	993	6	1	1080	0	7237	1206.2
LIV		US	586	354	84	1120	837	1195	4176	696.0
LIV		ZA	78	173	798	726	263	20	2058	343.0
LIV		ZM	0	0	0	0	800	285	1085	180.8
LIV		ZR	0	0	0	0	1150	1500	2650	441.7
LIV		ZW	0	0	78	31	72	0	181	30.2
SHE		NA	0	0	1	0	5	0	6	1.0
SHE		NL	0	0	0	0	26	0	26	4.3

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	total	average
SHE		TZ	1	2	0	0	0	0	3	0.5
SHE		ZA	4	0	2	0	0	0	6	1.0
SHE		ZW	0	0	0	0	1	0	1	0.2
SKU		ZA	0	1	0	0	0	0	1	0.2
SKU		ZW	0	1	0	0	0	0	1	0.2
SPE		ZA	0	0	1	0	0	0	1	0.2

CONSERVATION MEASURES

Broadley (1989) stated that 'the species seems to be in no danger, as it is protected in numerous national parks and other reserves throughout its range'. He further reported that 'there are good populations in the Kalahari.

Burundi: the Management Authority of Burundi stopped any export for commercial purposes of reptile species from November 1992. Any CITES document for specimens of those species issued or allegedly issued by Burundi was to be communicated to the Management Authority (CITES Notification No. 705). This export suspension was rescinded in August 1994 (CITES Notification No. 817).

Kenya: protected by Legal Notice 152, 1981, pursuant to the Wildlife (Conservation and Management) Act of 1976, as amended in 1989. This confers the status of Game Animal to the Leopard Tortoise (referred to in the Legal Notice as *Testudo pardalis*), which means that a licence is required to hunt or capture it. A certificate of ownership is required to possess any Game Animal. A separate permit is required to keep a live Game Animal in captivity. No Game Animal may be transferred by way of gift, sale or otherwise unless the person transferring the Game Animal endorses their certificate of ownership with the date of transfer and gives the certificate to the other person. Export of Game Animals is prohibited without an export permit (TRAFFIC East/Southern Africa *in litt.* to TRAFFIC International, 1999).

Mozambique: export quota set at 3,000 *G. pardalis* (presumed wild origin) for 1995; 10,000 (wild and ranched) for 1996; 5,000 wild caught and 5,000 ranched for 1997 and 1998 (CITES Notification Nos. 874; 916; 994; 1998/07).

Namibia: no commercial trade is encouraged in the species (M. Lindeque, *in litt.* to CITES Secretariat, 1999). The species is known or expected to occur in 17 protected areas (albeit marginally in some) (M. Griffin *in litt.* to Ministry of Environment and Tourism, Republic of Namibia, 1999).

South Africa: all tortoises are protected under South African law. The specific protection is as follows:

Transvaal (Gauteng province, North West and Northern Province) - listed as Protected (Game Nature Conservation Ordinance 12 of 1983).

Mpumalanga - listed as Protected (Nature Conservation Ordinance 12 of 1983).

Free State - all tortoises are listed as Protected Game (Nature Conservation Ordinance 8 of 1969).

Cape (Eastern-, Northern- and Western Cape) all tortoises are listed as Protected Wild Animals (except *Psammobates geometricus* which is listed as an Endangered Wild Animal) (The Nature and Environmental Conservation Ordinance 19 of 1974).

KwaZulu-Natal lists all tortoises as Specially Protected Reptiles (The Nature Conservation Ordinance 15 of 1974)

Permits are needed in all provinces to keep in captivity, kill, capture, donate, sell, buy, export, import, transport, remove from the wild and release species.

In the Cape Province, 'the typical form is protected in the Addo Elephant, Bontebok, Karoo, and Mountain Zebra National Parks, as well as another 14 nature reserves' (Broadley, 1989). *G. pardalis*

has also been recorded in the Ndumu and Mkuzi Game Reserves of KwaZulu-Natal Province, South Africa (Bruton and Haacke, 1980).

Tanzania: under the Tanzanian Wildlife Conservation Act, 1974, the capture of live animals requires a valid *Trapper's Card* and a *Permit to Capture Animals* (fees vary depending on animal). There are also specific requirements for holding grounds. Tortoises are classified as National Game and are prohibited from being hunted, killed, captured or wounded unless with the written permission of the Director. All trophies must be registered with a *Certificate of Registration* and every trophy dealer must carry a valid *Trophy Dealer's Licence* (class 15 for live or stuffed reptiles). Exports of trophies must be accompanied with a *Trophy Export Certificate* (TRAFFIC East/Southern Africa *in litt.* to TRAFFIC International, 1999).

In response to decisions by the CITES Standing Committee the Management Authority of Tanzania suspended all exports of wild-caught *G. pardalis* in 1993 and introduced a policy that restricted live exports to specimens derived from captive-breeding.

In 1997, Tanzania included the species in its list of quota species (which includes species listed in CITES appendices and unlisted species (Jenkins *et al.*, 1999)), but with a zero quota. The 1998 quota was also zero. Despite this zero quota, two CITES export permits were issued for 302 live ranched specimens (see below) to France in 1998 (TRAFFIC East/Southern Africa *in litt.* to TRAFFIC International, 1999).

A large population of *G. pardalis* exists within the Serengeti National Park, northeast Tanzania (Lambert *et al.*, 1998). Populations have also been recorded in the Lake Manyara, Tarangire and Ruaha National Parks, and in Maswa, Grumeti and Ikorongo Game Reserves (Kabigumila, 1998; Lambert *et al.*, 1998).

Zimbabwe: according to the Parks and Wild Life (General) Regulations, 1990, no person shall keep, breed or produce reptiles for sale or for the purpose of selling any trophy therefrom unless he is the holder of a breeder's license (Parks and Wild Life (General) Regulations, 1990. Statutory Instrument 362 of 1990. Part IV, Sections 61-65 pertain to Breeding and Production of Reptiles and Amphibia). *G. pardalis* is widespread in the Sengwa Wildlife Research Area (18°6'S, 28°12'E), Gokwe District (Hailey and Coulson, 1995).

CAPTIVE BREEDING

Bartlett (1994) reported that the species is being bred in increasing numbers, particularly in the southwestern USA, and a few breeding programmes exist in Florida.

Kenya: see International Trade section.

Mozambique: between 1995 and 1996 Mozambique reported the export of a total of 2,000 ranched or captive-bred specimens to Japan, the USA, and Singapore.

Namibia: *G. pardalis* is a common garden reptile species in some urban areas, and breeding occurs relatively frequently (M. Lindeque, *in litt.* to CITES Secretariat, 1999).

Tanzania: in 1993 four dealers were licensed by the Wildlife Division to conduct tortoise ranching operations (primarily of this species and the Pancake Tortoise *Malacochersus tornieri*) (Kabigumila, 1998). The majority of specimens of *Geochelone pardalis* originating from Tanzania recorded in CITES Annual Reports after 1992 were declared as captive-bred or ranched.

During December 1998 the CITES Animals Committee investigated captive-breeding facilities in Tanzania. It concluded that all four operations were breeding tortoises in captivity (although only to the first generation) and concluded that the management system being applied by each farm did not conform with ranching as defined by CITES (Jenkins *et al.*, 1999). The representatives of the Committee recommended measures to improve on-farm husbandry, management, administration and control (Jenkins *et al.*, 1999).

From 1994 large numbers (>450 per year) of declared captive-bred and F1 specimens of *G. pardalis* were reported as imports to Japan from the USA. Approximately 100 declared captive-bred *G. pardalis* were exported from Switzerland to Japan between 1994 and 1995.

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Yemen: the presence of *U. aegyptia* requires confirmation. *U. aegyptia* was not collected during a study of the amphibians and reptiles of the Yemen Arab Republic undertaken by Schätti (1989).

Six of the 14 range states are not CITES Parties (Bahrain, Iraq, Kuwait, Oman, Qatar, Syria).

There are two subspecies recognised:

U. a. aegyptia (Forskål): Sudan, Egypt and Sinai (Leviton *et al.*, 1992).

U. a. microlepis (Blanford): Arabian Peninsula, Syria, and Iraq. Leviton *et al.* (1992) give the following range information for *U. a. microlepis*: Gulf coast of the Arabian Peninsula and the area at the head of the gulf on either side of the Shatt-al-Arab in extreme southwestern Iran and extreme southeastern Iraq (Basra and Fao).

HABITAT AND ECOLOGY

A large lizard specialised to live in arid desert regions. *U. aegyptia* is a generalist herbivore which lives in burrows. Bouskila (1986) suggested that habitat selection by *U. aegyptia* in Hazeva, Israel was largely determined by the distribution of *Acacia tortilis*, the main summer food plant, which grows mostly in the wadis, forming a landscape of pseudo-savannah; population density appears to be mainly affected by food-availability. The mean distance between each burrow and its nearest neighbour at Hazeva was 46 m. Al-Ogily and Hussain (1983) report that *U. aegyptia* at Al-Kharj, Saudi Arabia live in small groups of 3 to 4 individuals. There is little information on the breeding. Captive clutch size is reported to be around 18 eggs (Christie, 1993). There appears to be no information available on age of maturity and longevity. Activity rates of *U. aegyptia* are much reduced during winter: aestivation does not occur (Bouskila, 1986).

THREATS TO SURVIVAL AND DOMESTIC USE

Egypt: Negus, (1997) reports that the conversion of scrubland to barley fields is leading to extensive habitat loss for *U. aegyptia*.

U. aegyptia has been recorded in traditional medicine use. Since 1994/95, street traders have been observed selling extracts of *Uromastyx* spp., with live specimens of *U. aegyptia* on display for medicinal purposes (TRAFFIC International, *in litt.* to WCMC, 1999). Further investigation is required to determine the scale of the medicinal trade in *U. aegyptia*.

A high mortality rate of *U. aegyptia* during transport is reported (Gray, 1995).

Mandaville (1965) reported that '*Uromastyx* is a fairly common element in the diet of many Bedouin Arabs, and specimens are occasionally sold alive in the markets for food'.

INTERNATIONAL TRADE

Reported international trade in *U. aegyptia* between 1991 and 1996 involved around 12,000 specimens, comprised almost entirely of live wild animals reportedly of Egyptian origin (over 90% of animals reported). However, the export of *U. aegyptia* from Egypt was banned from 1992 (Anon., 1992), and no exports were reported by Egypt between 1991 and 1996. As the majority of specimens in trade during this period were reported as imports from Egypt further investigation is required. It is presumed that the majority of these were destined for the herpetological pet market, although trade for medicinal use has been reported.

During 1991 and 1992 Israel re-exported considerable numbers (~340 and 60 respectively) of *U. aegyptia* reportedly of Egyptian origin, principally to the USA. Only 10 specimens were recorded as imports by Israel. Few specimens of Israeli origin entered trade (<70 in total). There were few records of *U. aegyptia* originating in other range states; the majority of these animals were exported for scientific purposes. During 1996 there were no exports of *U. aegyptia* reported by range states.

The USA was by far the major importer of the species: in 1991 approximately 25% of specimens in trade were imported by the USA, 80% in 1992, 100% in 1993, 70% in 1994, 95% in 1995, and 100% in

Uromastix aegyptia (Forskål, 1775)

Egyptian Mastigure
Lagarto de cola espinosa egipcio
Fouette-queue d'Egypte

Order: SAURIA

Family: AGAMIDAE

SUMMARY

Widely distributed in north-eastern Africa and the Arabian Peninsula. There is little information available on the exact distribution of this large lizard, details of population status are scarce, as is information about breeding biology and longevity. Virtually all specimens recorded in trade (mostly recorded as imports by the USA) were reported to have originated in Egypt. The export of *U. aegyptia* from Egypt was banned in 1991 under Ministerial Decree 1403 (CITES Notification No. 662); no exports of this species have been reported by Egypt between 1991 and 1996. Confirmation of the origin of specimens in international trade is desired. Without further estimates of population status and the origin of specimens in trade it is not possible to determine if international trade is adversely affecting wild populations of *U. aegyptia*.

The species is recommended under Decision 10.79 for inclusion in category d) ii.

DISTRIBUTION AND POPULATION

Distributed in north-eastern Africa and throughout much of the Arabian Peninsula. There is little information relating to populations of this species.

Bahrain: present (Gallagher, 1971).

Egypt: distributed east of the Nile River (Anon. 1999); Disi (1991) comments that *U. aegyptia* is widespread in Egypt.

Iran: extreme southwestern Iran (Leviton *et al.*, 1992).

Iraq: extreme southeastern Iraq near Basra and Fao (Leviton *et al.*, 1992); Disi (1991) comments that it is widespread in Iraq.

Israel: the Arava and north to En Gedi along the Dead Sea coast, also in the loess region of Tel Malhata (Ilani, 1981); studied by Bouskila (1986) near the Hazeva Field Station Study Center, Arava, southern Israel (30°47'N, 35°25'E).

Jordan: widespread (Disi, 1991).

Kuwait: distribution information incomplete; recorded by Robinson (1995) from eastern Kuwait; Disi (1991) comments that it is widespread in Kuwait.

Oman: present, recorded by Arnold (1980) from Dhofar; further distribution details are unclear.

Qatar: present (Thatcher, no date a.).

Saudi Arabia: Al-Ogily and Hussain (1983) report that 'In the central part of the country *Uromastix aegyptia* is one of the most dominant species'. Anon. (1999) reports *U. aegyptia* as occurring in northern Saudi Arabia; Disi (1991) comments that *U. aegyptia* is widespread in Saudi Arabia.

Sudan: reported to be present by Leviton *et al.* (1992). This requires further confirmation.

Syria: present (Anon., 1999).

United Arab Emirates: no available distribution information; recorded as 'frequent' by R.J. Hornby (*in litt.* to Brian Groombridge, 1996).

1996. There was substantial annual increase in the number animals imported by the USA; in 1991 approximately 350 *U. aegyptia* were imported, by 1995 this had risen to nearly 6,000 animals, most of which were reported to be of Egyptian origin (including 80 animals declared to be of pre-convention origin). Between 1994 and 1995 a substantial number of animals (~140) were re-exported from the USA.

Europe and Japan reported the import of substantial numbers of *U. aegyptia*. Almost 1,500 specimens were imported by European countries over the period 1991 to 1996. Belgium, Germany, the United Kingdom, and Spain received most of these imports. Approximately 130 animals were reported as imports by the United Kingdom from the non-range states of Burundi and Tanzania; CITES Annual Reports give no details as to the provenance of these specimens. In 1995, 20 *U. aegyptia* were reported as imports by Switzerland from Lebanon; Lebanon is not a range state, there are no details as to the origin of these specimens (Hraoui, 1996). Japan reported the import of over 1,000 specimens (including 480 declared captive-bred) as direct imports from Egypt or re-exports from the USA of animals of Egyptian origin.

Gray (1997; 1998) reports that *Uromastix* lizards have become popular in the pet trade in the last few years. The substantial decline in price per animal in the USA between 1986 (US\$580) and 1995 (US\$57) is attributed to increased market availability (Hoover, 1998). In 1998/1999 the average dealer price advertised on the internet in Germany was DEM435 (US\$245) per animal.

Three separate seizures of *U. aegyptia* took place in October 1997 at Penang International Airport, Malaysia. In each case, individuals were detected on arrival from Egypt: 5.195kg of dried spiny tail lizard; 34 live animals; and 17 live animals all originating from Egypt (Source: Malaysian Customs Seizure Data, 1997 provided by TRAFFIC Southeast Asia *in litt.* to TRAFFIC International).

Illegal shipments of *U. aegyptia* have been recorded in CITES Annual Reports by the USA, the Czech Republic, and Spain. The only *U. aegyptia* reported by the USA during 1996 was a seizure of 500 animals, declared to be of Sudanese origin, re-exported to the USA from Egypt. In 1993, 18 animals of Egyptian origin were seized by the USA. During 1995, 63 animals exported from Ukraine were seized by the Czech Republic. In 1992 about 100 animals reportedly of Egyptian origin were seized by Spain.

Gross exports of *Uromastix aegyptia*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	Total	Average
BOD		BH	0	0	1	0	0	0	1	0.2
BOD		EG	0	0	6	0	0	0	6	1.0
BOD		GB	0	0	0	3	0	0	3	0.5
LIV		BI	25	0	0	0	0	0	25	4.2
LIV		CS	0	3	0	0	0	0	3	0.5
LIV		CZ	0	0	0	0	7	0	7	1.2
LIV		DE	10	0	0	0	0	0	10	1.7
LIV		DK	0	0	0	0	2	0	2	0.3
LIV		EG	1125	566	429	2225	6066	500	10911	1818.5
LIV		GB	0	0	0	4	0	0	4	0.7
LIV		HU	0	0	0	0	1	2	3	0.5
LIV		IL	399	60	0	0	0	0	459	76.5
LIV		LB	0	0	0	0	20	0	20	3.3
LIV		SA	0	50	70	0	0	0	120	20.0
LIV		TZ	108	0	0	0	0	0	108	18.0
LIV		UA	0	0	0	0	63	0	63	10.5
LIV		US	1	8	0	111	132	11	263	43.8
SKU		CH	0	0	0	0	0	1	1	0.2

CONSERVATION MEASURES

Egypt: the Government of Egypt banned the export of *U. aegyptia* under Ministerial Decree 1403 of October 1991, and requested other Parties to inform the Management Authority of Egypt of any attempts to trade in this species (CITES Notification No.662).

Further information on management programmes for *U. aegyptia* are required for other range-states.

CAPTIVE BREEDING

Adult *U. aegyptia* are apparently difficult to establish in captivity and often die because their specialised needs cannot be met by novice hobbyists; young animals reportedly do better in adapting to captivity (Thatcher, no date a.; no date b). At least two zoos and some private breeders have bred *Uromastix aegyptia*, however, the species is not bred consistently or in great numbers (Christie, 1993; Gray, 1995; 1998).

Approximately 480 declared captive-bred *U. aegyptia* of Egyptian origin were recorded as imports by Japan in 1991. During the same year approximately 340 declared captive-bred animals of Egyptian origin were reported as re-exports from Israel to the USA. A smaller number (~60) of Egyptian captive-bred specimens were re-exported to the USA by Israel in 1992. Around 60 declared captive-bred *U. aegyptia* of Israeli origin were reported as exports to the USA and Switzerland during 1991. Given the difficulties experienced by enthusiasts in breeding this species further investigation is required.

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Bradypodion fischeri (Reichenow, 1887)

Fischer's Chameleon
Caméléon nain de Fischer

Order: Sauria

Family: Chamaeleonidae

SUMMARY

A small chameleon known from montane areas of eastern Tanzania and Mount Kenya in Kenya. No estimates of wild population levels have been located. No exports have been recorded from Kenya in the period 1991-1996. Exported in some numbers by Tanzania, mainly to the USA for the live animal trade. Exports have risen from negligible numbers in 1991 to several thousand per year from 1993 onwards. Export quotas from Tanzania appear to have been exceeded in each year from 1994 to 1998. Levels of export from Tanzania are unlikely to be a problem, however in the absence of population data and given the rapid rate of deforestation in the Eastern Arc mountains of Tanzania this cannot be stated with complete certainty.

The species is recommended under Decision 10.79 for inclusion in category d (ii) (Tanzania only).

DISTRIBUTION & POPULATION

Kenya and Tanzania.

Kenya Recorded from Mount Kenya, as the subspecies *B. fischeri excubitor* (Klaver and Böhme, 1997; Loveridge, 1957). No population data are available.

Tanzania Apparently confined to the Eastern Arc forests, where recorded from the Usambara and Uluguru Mountains and at least some of the more isolated mountains lying between the two. Three subspecies are recognized: *B. f. fischeri*, recorded from the eastern Usambara Mountains south to Nguru Mountain; *B. f. multituberculatum* from the western Usambara Mountains and Mogropta Mountains and *B. f. uluguruensis* from the Uluguru Mountains (Broadley and Howell, 1991; TRAFFIC East/Southern Africa *in litt.*, 1999). Information received by TRAFFIC East/Southern Africa indicates that of the Tanzanian subspecies, *B. f. uluguruensis* has the smallest range (TRAFFIC East/Southern Africa *in litt.*, 1999). No estimates of wild populations are known to have been made (Howell, *in litt.* 1999).

Very few studies on population densities of any chameleon species in the wild have been carried out. A recent brief assessment in Ranomafana National Park in south-east Madagascar of population densities of six sympatric chameleon species (two *Brookesia* spp. and four *Calumna* spp.), both within forest and along paths cuts through forest, produced estimated population densities ranging from ~7 to ~40 individuals per hectare, with two species too rarely recorded to allow quantitative estimation (Jenkins *et al.*, 1999). Enormous care must be taken when extrapolating from these figures to other species in other habitats, but they may indicate that chameleon population densities of some tens of individuals per hectare are not unusual.

HABITAT AND ECOLOGY

Has been said to be a forest-dependent species, although also found on the forest edge (Howell, *in litt.* 1999) and, according to one source (TRAFFIC East/Southern Africa *in litt.*, 1999), *B. f. multituberculatum* at least is reportedly commoner in disturbed areas rather than forest.

Observations in captivity indicate that the females lay 10-20 eggs per clutch, depending on the subspecies, a few times a year. Eggs hatch after an incubation period of between 5 and 6 months, this being relatively fast for a chameleon (Anon., 1999).

THREATS TO SURVIVAL

Kenya Deforestation on Mount Kenya is believed most likely to be the major threat (Rotich *in litt.* TRAFFIC East/Southern Africa, 1999).

Tanzania The Eastern Arc mountains are subject to major, although unquantified, deforestation (Lovett and Wasser, 1993). This may be expected to pose a particular threat to *B. f. uhunguruensis* because of the latter's restricted range (TRAFFIC East/Southern Africa *in litt.*, 1999).

There is no reported domestic use.

INTERNATIONAL TRADE

Virtually all of the ca 22,000 individuals recorded in trade in CITES annual reports for the period 1991-1996 were exports of live animals from Tanzania. With the exception of 152 recorded as imported to Belgium from Madagascar in 1993 (almost certainly a misidentification or misdeclaration) and 50 reported as exported from Zaire to Uganda (also almost certainly some kind of reporting error), the remaining 560 or so were declared as re-exports of animals originating in Tanzania, the great majority being exports from the USA. The latter was the major importing country, accounting for some 60% of declared trade from Tanzania. Most of the remainder was imported by various European countries with some (less than 10% of total trade) going to the Far East or Canada.

From only 2 declared in trade in 1991, and ca 800 in 1992, trade has risen significantly (~ 4000-7600 per year) from 1993 onwards. As with trade from Tanzania in *Chameleo jacksoni*, export levels peaked in 1994 and subsequently declined, to around 5300 in 1995 and just under 4000 in 1996.

Gross exports of *Bradypodion fischeri*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	total	average
BOD		TZ	0	0	0	0	0	3	3	0.5
LIV		MG	0	0	152	0	0	0	152	25.3
LIV		NL	20	0	0	0	0	0	20	3.3
LIV		TZ	2	797	4463	7571	5345	3908	22086	3681.0
LIV		US	0	4	173	86	111	12	386	64.3
LIV		ZR	0	0	0	0	50	0	50	8.3
SPE		TZ	0	0	6	0	0	0	6	1.0

The majority of trade reportedly involves *B. f. multituberculatum* (TRAFFIC East/Southern Africa *in litt.*, 1999).

Comparison of export quotas set by Tanzania, and export trade from Tanzania as recorded in annual reports to CITES indicates that export quotas were exceeded in each year from 1994 to 1998.

Year	Export quota set by Tanzania	Minimum gross recorded exports from Tanzania [†]	Exports recorded by Tanzania [†]	Recorded imports from Tanzania [†]
1994	2000	7571	7609	4152
1995	2540	5345	3913	4688
1996	3000	3908	3865	2802
1997	3000	4916 [‡]	4916 [‡]	
1998	3000+453	3878 [‡]	3878 [‡]	

[‡] source WCMC CITES database unless otherwise stated

[†] export data from Tanzania provided by TRAFFIC East/Southern Africa, all declared wild origin.

* 453 ranches specimens

Average retail prices for this species in the USA are fairly low for a chameleon, lying in the range US\$35-60 for the period 1993-1996 (Hoover, 1998), with no discernible trend. At least one dealer was offering the species at US\$35 in early 1999. In the Netherlands one dealer was offering the species on the internet at NLG 150 (ca. US\$75) in early 1999.

CONSERVATION MEASURES

Kenya *Bradypodion fischeri* is not covered by any legislation in Kenya (TRAFFIC East/Southern Africa *in litt.*, 1999). Some 715 km² of Mount Kenya is included in a national park (Sayer *et al.*, 1992). It is unclear whether the species occurs within the park or not.

Tanzania Much of the range of *B. f. fischeri* is reportedly in game reserves (TRAFFIC East/Southern Africa *in litt.*, 1999). Under Tanzania's Wildlife Conservation Act, 1974, the capture of live animals requires a valid *Trapper's Card* and a *Permit to Capture Animals* (fees vary depending on animal). There are also specific requirements for holding grounds. Any nesting reptile is classified as National Game and it is prohibited to hunt, kill, capture or wound such animals without the written permission of the Director. In addition, all trophies must be registered with a *Certificate of Registration* and every trophy dealer must carry a valid *Trophy Dealer's Licence* (class 15 for live or stuffed reptiles). Exports of trophies must be accompanied by a *Trophy Export Certificate* (TRAFFIC East/Southern Africa *in litt.*, 1999). Export quotas set by Tanzania are detailed above.

B. f. uluguruensis is apparently to some extent naturally protected from overcollection because of the steep terrain where it occurs (TRAFFIC East/Southern Africa *in litt.*, 1999).

CAPTIVE BREEDING

The species has been bred in captivity (Anon., 1999). It is not known how much of the domestic trade, in any, within consumer countries is in captive-bred animals.

Howell (*in litt.*, 1999) notes that some operations in Tanzania are currently (February 1999) rearing some of this species in captivity. It is unclear whether these are captive-bred, or represent clutches laid by wild-caught gravid females, or are simply wild-collected individuals, and also what the scale of such operations is.

NOTES

The taxonomic status of the *Bradypodion* population on Mount Kenya should be investigated. Spawls and Duff-Mackay (1995) only list two species of *Bradypodion* for Kenya: *B. tavetanum* from the Taita Hills (formerly included in *B. fischeri* (Loveridge, 1957)) and *B. tenue* from the Shimba Hills.

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Dendrobates auratus (Girard 1855)

Green-and-black Poison Frog
Dendrobates dore

Order: ANURA

Family: DENDROBATIDAE

SUMMARY

Restricted to the tropical rainforests of southern Central America. Information is lacking on the exact distribution of the species, details of population size or status appear to be unavailable. *D. auratus* has a low fecundity and shows a high level of parental care. The majority of specimens entering international trade originated in Nicaragua and prior to 1996 were declared to be of wild origin; from 1996 most specimens recorded were declared captive-bred. *D. auratus* is reported to be easy to breed in captivity. The paucity of information on population size makes it difficult to assess whether exports from Nicaragua have been detrimental to wild stocks; further details on captive-breeding operations for this species would be useful in assessing their contribution to international trade.

The species is recommended under Decision 10.79 for inclusion in category d) ii.

DISTRIBUTION AND POPULATION

Generally distributed in the tropical forests of southern Central America. Population status information is scarce; *D. auratus* has been generally described as 'common' (Anon., 1987); *Dendrobates* species are considered difficult to census because of their size and tendency to conceal themselves. Further field studies are required to determine the global population status of *D. auratus*.

Colombia: recorded from Chocó (Silverstone, 1975).

Costa Rica: recorded from Alajuela, Cartago, Puntarenas, Limón (Silverstone, 1975).

Nicaragua: recorded from Río San Juan (Silverstone, 1975).

Panama: recorded from Bocas del Toro, Chiriquí, Veraguas, Herrera, Santos, Coclé, Colón, Canal Zone, Panamá, San Blas, Darién (Silverstone, 1975).

[USA]: in 1932, 206 specimens of *D. auratus* from Taboga or Taboguilla Islands, Panama were released in the upper Manoa Valley, Oahu, Hawaii in an attempt to control non-native insects (Silverstone, 1975; McKeown, 1996). A few feral populations of *D. auratus* descended from these animals still persist in the mountains and valleys of Oahu (J. Alvarez, *in litt.* to WCMC, 1999).

There is great geographic variation in the appearance of this species; over 15 distinct colour morphs of wild *D. auratus* have been recorded. (Heselhaus, 1992).

HABITAT AND ECOLOGY

D. auratus inhabits lowland tropical wet or moist forest, to an elevation of 800 m; also found in dense secondary growth and cocoa plantations (Kitasako, 1967; Heselhaus 1992; Silverstone, 1975). Males are essentially non-territorial, but occasionally engage in aggressive competition (Wells, 1978). *D. auratus* is polygynous; females actively compete for males and attempt to guard their mate from others. The species shows a high degree of paternal care. After oviposition upon leaf litter the male guards and cares for the clutch of three to 13 eggs (Silverstone, 1975; Schafer, 1981; Heselhaus, 1992). On hatching (13 to 16 days in captivity) the tadpoles are carried by the male to a stagnant waterbody in a tree-hole, the leaf axil of a bromeliad, or a small ground pool (Eaton, 1941; van Wijngaarden, 1990). Wild tadpoles feed on protozoans and rotifers, and metamorphose after 39 to 89 days; in captivity, sexual maturity is attained at between six and 15 months (Eaton, 1941; Silverstone, 1975; Summers, 1990; Zimmermann and Zimmermann, 1994). A reduction in the number of egg clutches and tadpoles maintained by the male results in a more rapid development of the eggs and higher growth rate of tadpoles (Wells, 1978; Summers, 1990). Longevity of at least six years reported in captivity (Zimmermann and Zimmermann, 1994).

THREATS TO SURVIVAL AND DOMESTIC USE

Habitat loss remains the principal threat to *Dendrobates* species (Zimmermann and Zimmermann, 1994).

Panama: habitat loss is reported to have occurred over large areas; remnant populations are found in narrow strips of riverine vegetation (Heselhaus, 1992). The blue morph of *D. auratus* present on the Pacific side of Panama is believed to be threatened with extinction (Heselhaus, 1992).

[USA]: McKeown (1996) states that populations on Oahu are highly sensitive to destruction of their habitat and overcollection.

Owing to the apparently low fecundity of this species, the possibility exists that overharvesting, especially of the rarer morphs, may contribute to localised population declines. There seems to be no recorded local use of the species.

INTERNATIONAL TRADE

Approximately 18,500 specimens of *D. auratus* were reported in trade over the period 1991 to 1996. The great majority of specimens were live animals, exported from Nicaragua, and presumably destined for the herpetological pet market. Gross exports from Nicaragua rose steadily between 1992 (~410 animals) and 1996 (~7,025) suggesting an increased demand for the species. Between 1991 and 1995 most of the specimens reported in trade were of wild origin, from 1994 the number of captive-bred animals increased, by 1996 the majority of animals reported as exports by range-states were declared captive-bred. Exports of wild *D. auratus* reported by Nicaragua in 1995 and 1996 fell within set export quotas (CITES Notification Nos. 874; 916). All reported exports of *D. auratus* from Panama were for scientific purposes (D.M. Botello *in litt.* to CITES Secretariat, 1999).

The USA was by far the largest single importer of *D. auratus* (~15,000 animals in total); most of these specimens originated in Nicaragua (~90%). Virtually all of the specimens imported into Western Europe between 1992 and 1996 from range states (~1,700 animals) were of Nicaraguan origin (98%). The majority of specimens re-exported by the USA between 1992 and 1996 (~500 animals) were reported to be of Nicaraguan origin.

A single record of illegal trade in *D. auratus* was recorded in CITES annual reports between 1991 and 1996. During 1994 two specimens originating in Panama were reported as seizures by the USA.

Retail dealer prices advertised on the internet in 1998/1999 varied greatly with regards to the provenance and morph of *D. auratus* available. Wild specimens described as 'Costa Rican' were priced in the USA at US\$25-35 per frog, and in the Netherlands at NLG65 (US\$33 per frog); 'Panamanian' specimens were available at US\$40 per frog in the USA and NLG65 (US\$33 per frog) in the Netherlands. Wild specimens from Hawaii were advertised in the USA for US\$35 per frog; it is presumed that these specimens pre-dated the 1998 export ban. Various types of the apparently rarer blue morphs were available in the USA at US\$85-150, and in France at 420FF (US\$72). Specimens of green and black morphs advertised as 'captive bred' were available in the USA at US\$55 per frog; second generation blue morph specimens were advertised in the USA for US\$70.

Gross exports of *Dendrobates auratus*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	Total	Average
BOD	PA		0	0	0	15	0	0	15	2.5
LIV	CR		0	43	30	0	0	20	93	15.5
LIV	CZ		0	0	0	0	0	50	50	8.3
LIV	DE		0	0	192	146	40	135	513	85.5
LIV	DK		0	0	0	0	40	10	50	8.3
LIV	EC		0	0	0	100	0	0	100	16.7
LIV	FR		0	0	92	0	0	0	92	15.3
LIV	GB		0	0	0	364	6	6	376	62.7
LIV	HU		0	107	140	0	10	80	337	56.2

LIV	NI	4	410	1873	2690	3141	7026	1514	2524.0
								4	
LIV	NL	0	6	91	80	209	271	657	109.5
LIV	PA	43	48	8	2	0	24	125	20.8
LIV	PE	0	0	0	0	123	0	123	20.5
LIV	SG	0	0	0	0	0	10	10	1.7
LIV	SK	0	0	12	6	0	0	18	3.0
LIV	US	0	57	72	43	272	211	655	109.2
LIV	XX	0	0	0	0	0	100	100	16.7
SPE	NI	0	0	24	0	0	0	24	4.0

CONSERVATION MEASURES

Colombia: Decree INDERENA No. 39 of 9 July, 1985, forbids the collection of *Dendrobates* spp. from the wild for breeding (or other) purposes. The current validity of this legislation requires confirmation. Export of *D. auratus* is permitted from legally established captive-breeding operations (CITES Notification No. 572).

Nicaragua: an export quota of 2,000 wild *D. auratus* was set for 1995, this was reduced to 1,100 for 1996 and 1997 (CITES Notification Nos. 874; 916; 994) No export quota of wild *D. auratus* was given for 1998 (CITES Notification No. 1998/36).

[USA]: until recently, the government of the State of Hawaii had no restrictions on the export of feral *D. auratus* from Hawaii and CITES export permits were issued for this species by the US Office of Management Authority. However, because of a wide range of problems created by the introduction of exotic amphibian and reptiles species to Hawaii, the Hawaiian Department of Land Resources has recently passed legislation (rule changes to Chapter 13-124 of the Hawaii Administrative rules) making it illegal to possess, or commercially import or export exotic herpetofauna to/from that State. As a result, the US Office of Management Authority is now unable to make the required legal acquisition finding, and therefore, it is no longer issuing CITES export permits for *D. auratus* originating in Hawaii (J. Alvarez, *in litt.* to WCMC, 1999).

CAPTIVE BREEDING

Reported to be easy to keep and breed in the terrarium environment; artificially rearing the tadpoles apparently presents no problems (Heselhaus, 1992).

Nicaragua: the majority of specimens reported as exports in 1996 were declared to be captive-bred (~90%); this requires further investigation.

There is no available information on the viability of captive-bred *D. auratus* stocks. It has been suggested that after a few generations captive populations of *Dendrobates* spp. tend to collapse necessitating the collection of further wild individuals (Anon., 1987). Captive-bred specimens of *Dendrobates* spp. appear to produce few or no skin toxins (Kelley, 1998; Heselhaus, 1992).

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Dendrobates histrionicus Berthold 1845

Harlequin Poison Frog
Rana de punta de flecha histrionica

Order: ANURA

Family: DENDROBATIDAE

SUMMARY

Restricted to the rainforests on the Pacific side of the Andes of northeastern South America. Little information is available on the specific habitat requirements and distribution of the species; there appear to be no population estimates. Known populations of *D. histrionicus* have rapidly declined where rainforest habitat has been disturbed. The tadpoles of this species have a very specialised diet, feeding exclusively on food eggs supplied by the female; successful captive-breeding of *D. histrionicus* by hobbyists is therefore rare, and the species is considered difficult to propagate. The majority of specimens entering international trade are reported to have originated in Ecuador and were declared captive-bred. The captive-breeding operation in Ecuador is reported to have closed in April 1998, and exports to have been prohibited since that time. Recorded international trade from other than Ecuador is at a relatively low level and therefore is unlikely to have a significant impact on wild populations.

The species is recommended under Decision 10.79 for inclusion in category d) iii.

DISTRIBUTION AND POPULATION

Restricted to the Pacific side of the Andes of northeastern South America. *D. histrionicus* has been described as 'relatively common' (Anon., 1987). *Dendrobates* species are considered difficult to census because of their size and tendency to conceal themselves (Anon., 1987). There is little available information on population status.

Colombia: recorded from the Departamentos of Chocó, Antioquia, Risaralda, Valle, Nariño and possibly Cauca (Silverstone, 1975).

Ecuador: recorded from Provincia Esmeraldas and Provincia Pichincha (Silverstone, 1975).

Silverstone (1975) gave the following details of subspecies distribution, although their current validity is unclear:

D. h. histrionicus Berthold: eastern Atrato drainage (Río Arquía) and the upper Río San Juan.

D. h. wittei Laurent: western Atrato drainage, the Baudó drainage, the Alto del Buey, and the middle and lower San Juan drainage.

D. h. sylvaticus Funkhouser: northwestern Ecuador (Provincia Pichincha).

D. h. confluens Funkhouser: extreme southwestern Colombia (Departamento Nariño) and northwestern Ecuador (Provincia Esmeraldas); also at Andagoya, Colombia (Departamento Chocó).

The species exhibits a wide variety of distinct colour morphs (Silverstone, 1975; Zimmermann and Zimmermann, 1994).

HABITAT AND ECOLOGY

A diurnal and mostly terrestrial frog inhabiting lowland tropical rainforests and mountainous rainforests (to 1,000 m) with high levels of precipitation. *D. histrionicus* is usually found on the forest floor, but may also occur in low, bushy, secondary growth; a high abundance of bromeliads typify the habitat (Silverstone, 1975; Zimmermann and Zimmermann, 1994). The diet of *D. histrionicus* consists of ants and small insects foraged from the leaf-litter. Males are territorial and defend small areas; estimates of male home range vary between 4 and 5 m² (Summers, 1992). Silverstone (1975) observed a wild clutch of three eggs laid on a bromeliad at a height of 76 cm above the ground; leaf litter is also commonly used for oviposition. Clutch size in captivity ranges between four and nine eggs; captive females may have five reproductive clutches per year (Heselhaus, 1992; Zimmermann and Zimmermann, 1994). On hatching the female carries the tadpoles to bromeliad leaf axil pools and the

axils of *Heliconia* and *Calathea* plant stems; eggs may be deposited in different axils of the same bromeliad (Summers, 1992; Zimmermann and Zimmermann, 1994). *D. histrionicus* tadpoles are oophagous; the female returns periodically to deposit infertile food eggs for the tadpoles to feed on (Summers, 1992). There appear to be few data on the period required for metamorphosis. Captive froglets are reported to achieve sexual maturity at approximately 10 months (Zimmermann and Zimmermann, 1994). *D. histrionicus* has a captive longevity of 4 years (Zimmermann and Zimmermann, 1994).

THREATS TO SURVIVAL AND DOMESTIC USE

Habitat loss remains the principal threat to *Dendrobates* species (Zimmermann and Zimmermann, 1994).

Ecuador: Zimmermann and Zimmermann, (1994) recorded the rapid decline and extinction of several Ecuadorian populations of *D. histrionicus* following conversion of prime rainforest habitat to monocultures of oil palm, pineapple, or banana. They considered the highly specialised oophagous tadpoles to be especially vulnerable to habitat disturbance.

There seems to be no recorded local use of the species (Silverstone, 1975).

INTERNATIONAL TRADE

The great majority of reported trade over the period 1992 to 1996 was in live animals, presumably for the herpetological pet market. Between 1991 and 1993 there was little reported international trade (<45 animals). A substantial rise in numbers of *D. histrionicus* entering trade from Ecuador occurred from 1994. Nearly all animals reported as exports by range states originated in Ecuador and were declared as captive-bred specimens (approximately 3,800 in annual reports to CITES). All commercial exports of wild fauna from Ecuador are banned (CITES Notification No. 306), however in 1995 and 1996 the USA reported imports of wild animals of Ecuadorian origin (480 and 300 frogs respectively). The only Colombian specimens recorded in trade were 11 live animals of unknown source, and a re-export from Germany of 25 live animals of unknown source, both shipments were reported as imports to the USA.

The USA accounted for approximately 85% of recorded imports from range states in 1994, 100 % in 1995, and around 65% in 1996; much smaller proportions of *D. histrionicus* were exported from Ecuador to Belgium and Germany. Between 1994 and 1995 small numbers of Ecuadorian specimens (1994, 30 animals; 1995, 57 animals) were re-exported from the USA to Canada, Western Europe and Japan. Approximately 325 specimens reported as imports by the USA from Ecuador between 1994 and 1996 were reported as pre-convention origin. There were no illegal imports or exports recorded in CITES annual reports between 1991 and 1996.

During 1998/1999 the average dealer price advertised on the internet for *D. histrionicus* in the USA was US\$40-45 per frog; over the same period the average price in France was 360FF (US\$62) per frog. There were no details as to the provenance of specimens offered.

Gross exports of *Dendrobates histrionicus*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	Total	Average
BOD		EC	0	10	0	0	0	0	10	1.7
BOD		PA	0	10	0	0	0	0	10	1.7
LIV		CO	0	0	0	11	0	0	11	1.8
LIV		DE	0	25	0	0	0	0	25	4.2
LIV		EC	0	0	0	1425	1430	935	3790	631.7
LIV		US	0	0	0	50	57	0	107	17.8

CONSERVATION MEASURES

Zimmermann and Zimmermann (1994) reported on the Tobar Donoso Project in Colombia and Ecuador undertaken by national agencies, conservation institutions, the Awa Indians, and private

individuals to protect 530,000 ha area of pristine rain forest; this area is known to contain populations of *D. histrionicus*.

Colombia: Decree Inderena No. 39 of 9 July, 1985, forbids the collection of *Dendrobates* spp. from the wild for breeding (or other) purposes. The current validity of this legislation requires confirmation. Export of *D. histrionicus* is permitted from legally established captive-breeding operations (CITES Notification No. 572).

Ecuador: all commercial exports of wild fauna are banned (CITES Notification No. 306).

CAPTIVE BREEDING

Successful captive breeding of *D. histrionicus* by herpetological hobbyists is rare, and the species is considered very difficult to propagate (Heselhaus, 1992).

Ecuador: between 1994 and 1996 virtually all of the specimens reported as exports were declared as captive-bred (10 exported in 1994 were of unknown origin). The only captive-breeding centre for Dendrobatid frogs in Ecuador is reported to have closed in April 1998 (X. Buitron *in litt.* to TRAFFIC International, 1999).

Kelley (1998) states that *Dendrobates* spp. with an oophagous tadpole stage are 'almost exclusively available (to hobbyists) as wild-caught individuals'; the source of these wild individuals is not given. The viability of captive-bred *Dendrobates* stocks is uncertain. It has been suggested that after a few generations captive populations of *Dendrobates* spp. tend to collapse, necessitating the collection of further wild individuals (Anon., 1987). Captive-bred specimens of *Dendrobates* spp. appear to produce few or no skin toxins (Kelley, 1998; Heselhaus, 1992).

REMARKS

The validity of *D. lehmanni* Myers and Daly, has been questioned by Lötters (1992); this taxon may be synonymous with *D. histrionicus*.

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Dendrobates pumilio O. Schmidt 1857

Flaming Poison Frog
Rana de punta de flecha roja
Dendrobates pumilio

Order: ANURA

Family: DENDROBATIDAE

SUMMARY

Generally confined to forests in the southern part of Central America. Little information is available on the specific habitat requirements and distribution of the species; there appear to be no population estimates. The majority of specimens entering trade are reported to have originated in Nicaragua. Prior to 1996 most specimens recorded in international trade were of wild origin; from 1996 over 90% of *D. pumilio* in international trade were declared captive-bred. The tadpoles of this species have a very specialised diet, feeding exclusively on food eggs supplied by the female; captive tadpoles fed on an artificial diet develop very slowly. Given the difficulties in rearing this species, further details on captive-breeding operations for *D. pumilio* in Nicaragua would be useful. Owing to the general lack of information on the species it is difficult to assess the impact of international trade on wild populations.

The species is recommended under Decision 10.79 for inclusion in category d) ii.

DISTRIBUTION AND POPULATION

Generally confined to forests in the southern part of Central America. Population status information for *D. pumilio* is scarce. The species was described by McVey *et al.* (1981) as 'common in the Atlantic lowland tropical forests of Central America'. *Dendrobates* species are considered difficult to census because of their size and tendency to conceal themselves (Anon., 1987).

Costa Rica: recorded from Alajuela, Heredia, San José, Cartago, and Limón (Silverstone, 1975).

Nicaragua: recorded from Matagalpa, Chontales, Zelaya, Río San Juan, and possibly Chinandega (Silverstone, 1975).

Panama: recorded from Bocas del Toro and Veraguas (Silverstone, 1975).

This species exhibits significant colour and pattern polymorphism especially among populations in the Bocas del Toro archipelago of Panama (Summers *et al.*, 1997). Heselhaus (1992) mentions that the many different forms may cause confusion in identifying this species.

HABITAT AND ECOLOGY

A diurnal and mostly terrestrial frog that occurs in lowland tropical moist or wet forest, extending into premontane moist or wet forest to 960 m (Silverstone, 1975). *D. pumilio* occupies restricted areas within a relatively uniform habitat and forages for small insects in leaf litter (Kitasako, 1967). Males appear to be fiercely territorial; individual territories have been estimated at 2.5 m² (Donnelly, 1983). Observations concerning mating behaviour suggest that some *D. pumilio* are at times polygynous (McVey *et al.*, 1981; Donnelly, 1989; Zimmermann and Zimmermann, 1994). Females lay a clutch of three to nine eggs in moist leaf litter; clutch sizes in captive specimens of six to 16 eggs have been recorded (Limerick, 1980; Silverstone, 1975). There appears to be no information on the number of clutches laid annually. *D. pumilio* eggs hatch approximately seven days after oviposition, adults then carry the developed tadpoles from the forest floor to water filled bromeliads (Limerick, 1980). *D. pumilio* tadpoles have a very specialised oophagous diet, feeding solely on food eggs supplied by the female (Heselhaus, 1992; McVey *et al.*, 1981, Zimmermann and Zimmermann, 1994). There is little available information on wild larval development; Heselhaus (1992) reports that captive tadpoles fed an artificial diet 'grow slowly, taking four to six months, a third longer than with natural feeding, to reach metamorphosis'. Sexual maturity is reached at a minimum size of 19 mm (approximately 10 months). There are few data on longevity; Donnelly (1983) concluded that the population at Finca La Selva, Costa Rica was mostly comprised of 'long-lived' adults; Zimmermann and Zimmermann (1994) gave a longevity of 4 years for captive *D. pumilio*.

THREATS TO SURVIVAL AND DOMESTIC USE

Habitat loss remains the principal threat to all *Dendrobates* species (Zimmermann and Zimmermann, 1994). There is little information regarding the exploitation of *D. pumilio*. Illegal trade in the species has recently been recorded (De Witte, 1997), but the extent of this trade is unknown. Because of the apparently low fecundity of this species, the possibility exists that overharvesting may lead to localised population declines. There seems to be no local use of the species (Donnelly, 1983).

INTERNATIONAL TRADE

The great majority of reported trade over the period 1991 to 1996 was in live animals, presumably by the herpetological pet market. The largest overall exporter of *D. pumilio* was Nicaragua (>95% of exports); gross exports from this country rose greatly between 1992 (~350 animals) and 1996 (~7,500 animals). In 1995 slightly more animals (2,029 individuals) than the set quota of 2,000 were reported as exports by Nicaragua (CITES Notification No. 874). There were small quantities of animals exported from Costa Rica (approximately 370 in total); these were largely reported as for scientific purposes. All exports of *D. pumilio* from Panama (165 animals in total) were for scientific purposes.

The USA has consistently accounted for over 80% of recorded live *D. pumilio* imports from Nicaragua; the remaining animals reported were exported from Nicaragua to Japan and Western Europe. Between 1991 and 1996 relatively few animals were reported as exports from Costa Rica and Panama (~535 animals in total). There was little international trade in specimens other than live animals. Between 1993 and 1996 a small number of Nicaraguan specimens (~4% of total USA import) were re-exported from the USA to Canada, Western Europe, Singapore and Japan.

There was no illegal trade in *D. pumilio* recorded in CITES annual reports between 1991 and 1996. Illegal trade in this species has since been reported by De Witte (1997) who described an unsuccessful attempt by two Dutch citizens to illegally export 200 specimens of *D. pumilio* out of Costa Rica.

During 1998/1999 the average dealer price advertised on the internet for *D. pumilio* in the USA was US\$40 per frog; over the same period the average price advertised in the Netherlands was NLG95 (US\$48) per frog.

Gross exports of *Dendrobates pumilio*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	Total	Average
BOD		CR	0	0	7	0	0	0	7	1.2
BOD		US	0	0	0	0	0	2	2	0.3
LIV		CA	0	0	0	12	0	0	12	2.0
LIV		CR	0	55	58	80	80	98	371	61.8
LIV		DE	0	0	0	2	0	0	2	0.3
LIV		HU	0	0	12	0	16	20	48	8.0
LIV		NI	0	346	1774	2452	2704	7537	14813	2468.8
LIV		NL	0	0	15	10	15	20	60	10.0
LIV		PA	38	112	6	0	0	8	164	27.3
LIV		US	0	0	115	62	121	139	437	72.8
LIV		XX	0	0	0	0	0	50	50	8.3
SPE		NI	0	0	32	0	0	0	32	5.3

CONSERVATION MEASURES

Costa Rica: a well-studied population of *D. pumilio* is present in the Finca La Selva Biological Reserve, northeastern Costa Rica (Donnelly, 1983; 1989; 1991; Limerick, 1980; McVey, 1981; Pröhl, 1997); populations are suspected to occur in Braulio Carrillo National Park, Corcovado National Park, and Tortuguero National Park, Costa Rica.

Nicaragua: an export quota of 2,000 wild *D. pumilio* was set for 1995, this was reduced to 1,100 for 1996 and 1997 (CITES Notification Nos. 874; 916; 994) No export quota of wild *D. pumilio* was given for 1998 (CITES Notification No. 1998/36).

Panama: research has been undertaken into the polymorphic population of *D. pumilio* inhabiting the Bocas del Toro archipelago, including those of the Isla Bastimentos National Marine Park (Summers *et al.*, 1997).

CAPTIVE BREEDING

The species is captive bred and raised in terraria by herpetological hobbyists. Outside the terrarium environment the artificial feeding of the highly specialised tadpoles with chicken egg-yolk is reported to be a 'tedious business' (Heselhaus, 1992). According to Kelley (1998) *D. pumilio* in captivity are almost exclusively available as wild-caught individuals. Further research is required to determine the success rate of captive-breeding *D. pumilio*.

Nicaragua: the majority of *D. pumilio* reported as exports in 1996 (~90%) were declared captive-bred; further information on the level of captive-breeding is required.

There is no available material on the viability of captive bred *Dendrobates* stocks. It has been suggested that after a few generations captive populations of *Dendrobates* spp. tend to collapse necessitating the collection of further wild individuals (Anon., 1987). Captive-bred specimens of *Dendrobates* spp. appear to produce few or no skin toxins (Kelley, 1998; Heselhaus, 1992).

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Dendrobates tinctorius (Schneider 1799)

Dyeing Poison Frog
Dendrobate à tapirer

Order: ANURA

Family: DENDROBATIDAE

SUMMARY

Generally distributed in the lowland tropical forests of the Guiana Shield, northern South America. There is little information available on specific distribution or population status, however large areas of apparently suitable habitat, possibly supporting significant populations of *D. tinctorius*, remain. The species occurs in numerous colour morphs; it is possible that targeted collecting of more desirable morphs could lead to localised population declines. Virtually all wild specimens recorded in international trade originated in Suriname; annual exports for *D. tinctorius* from Suriname during 1995 and 1996 were lower than annual export quotas set for this species (1886 specimens). Trade in captive-bred animals developed steadily from 1992 onwards. By 1996 declared captive-bred frogs accounted for approximately 40% of all specimens traded.

The species is recommended under Decision 10.79 for inclusion in category d) iii.

DISTRIBUTION AND POPULATION

Generally distributed in the tropical forests of the three Guianas and adjacent northern Brazil. Not collected south of the Amazon River with any certainty (Silverstone, 1975). Population status information for *D. tinctorius* is scarce. *Dendrobates* species are considered difficult to census because of their size and tendency to conceal themselves (Anon., 1987).

Brazil: Amapá, and possibly Pará (Silverstone, 1975).

French Guiana: present (Silverstone, 1975).

Suriname: Nickerie, Saramacca, and Brokopondo (Silverstone, 1975).

Guyana: Rupununi (Silverstone, 1975).

There is a wide variation in colour and pattern between *D. tinctorius* populations; at least 24 colour morphs have been described (Som, 1999).

HABITAT AND ECOLOGY

A relatively large poison-dart frog which inhabits lowland tropical rainforest to elevations of about 300 m. A diurnal and mostly terrestrial species which is usually encountered amongst leaf-litter in shady areas of forest. Specimens can be found around local villages, and in other disturbed areas (Scales, 1998; Silverstone, 1975). The diet of *D. tinctorius* consists largely of ants and other insects. There is little material available on the reproductive behaviour of *D. tinctorius* in the wild. From information provided in Zimmermann and Zimmermann (1994) it is presumed that the oviposition occurs upon leaf litter and that the male guards and cares for the clutch of eggs. Following hatching it is suspected that the male transfers the tadpoles to a stagnant waterbody. In captivity *D. tinctorius* will breed year-round, except for a rest period which typically occurs in winter (de Vosjoli and McKeown, 1997). Captive clutches consist of between 7 and 9 eggs, and are laid several times per week (Zimmermann and Zimmermann, 1994; de Vosjoli and McKeown, 1997). In captivity tadpoles hatch after 14 to 18 days, with sexual maturity reached at between 18 and 21 months (Heselhaus, 1992; Zimmermann and Zimmerman, 1991). A captive longevity of 11 years has been recorded (Zimmermann and Zimmermann, 1994).

THREATS TO SURVIVAL AND DOMESTIC USE

Habitat loss remains the principal threat to *Dendrobates* species (Zimmermann and Zimmermann, 1994).

French Guiana: Yannick Vasse (1997) reports that the building of a road from Régina to St-Georges of Oyapock has been particularly harmful to the local biotope. This region is well known for its high levels of amphibian populations especially of *D. tinctorius* (which occurs in different morphs).

Populations distributed close to local villages may be susceptible to targeted collecting, as well as human population impacts (J.G. Wilkinson, *in litt.* to IUCN\SSC Trade Programme, 1999).

Silverstone (1975) mentioned various reports on the use of *D. tinctorius* by Amerindians for 'tapirage' - changing the feather colour of living parrots by rubbing defeathered areas with the blood or skin toxin of *D. tinctorius*. The Wai-Wai people of Guyana are reported to rub this frog on the nose of hunting dogs to make them more active, and to increase olfactory sensitivity (Silverstone, 1975).

INTERNATIONAL TRADE

Most specimens of *D. tinctorius* in trade between 1991 and 1996 were live, wild-caught individuals originating in Suriname, presumably for the herpetological pet trade. There were no recorded exports from the other range states. Approximately 5,450 wild-caught animals were recorded in trade between 1991 and 1996.

Prior to 1993 all recorded exports of wild-caught frogs were to the USA (1991, ~350 frogs; 1992, ~700 frogs). Between 1993 and 1996 the numbers of wild *D. tinctorius* imported annually by the USA fluctuated but generally continued to grow from around 260 frogs in 1993 to around 750 frogs in 1996.

From 1993 wild-caught *D. tinctorius* were exported from Suriname to Europe (principally the Netherlands and Switzerland). European imports of wild-caught *D. tinctorius* grew steadily over the period from approximately 365 frogs in 1993 to around 670 in 1996; by 1996 the European market accounted for approximately half the wild-caught animals in international trade. Exports of wild-caught *D. tinctorius* from Suriname to Europe and the USA between 1991 and 1996 increased four-fold. Suriname set an export quota of 1,886 *D. tinctorius* for 1995 and 1996, this was not filled in either year (CITES Notification Nos. 874; 916).

Trade in captive-bred animals developed steadily from 1992 onwards. Increasing numbers of captive-bred *D. tinctorius*, mostly originating in Germany and the Netherlands, were imported into the USA (1992, ~100 frogs; 1996, ~650). By 1996 declared captive-bred frogs accounted for approximately 40% of all specimens traded. There were few re-exports of *D. tinctorius*; the majority of transactions involved small numbers (~50) of declared captive-bred animals between non-range states.

Retail dealer prices published on the internet in 1998/1999 varied greatly with regards to the provenance and morph of *D. tinctorius* available. Prices in the USA ranged between US\$65-175 per frog, and in the Netherlands at NLG110-165 (US\$55-82). Captive-bred frogs were available in both the USA and Netherlands; it was unclear as to whether these specimens were more expensive than wild caught animals.

Illegal trade has occurred. Smuggling of wild *D. tinctorius* to the Netherlands and Germany has been reported (Scales, 1998).

Gross exports of *Dendrobates tinctorius*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	total	average
BOD	NL		0	0	0	0	0	2	2	0.3
LIV	CA		0	0	0	0	26	4	30	5.0
LIV	CH		0	0	0	0	0	80	80	13.3
LIV	DE		0	60	76	238	140	349	863	143.8
LIV	DK		0	0	0	0	0	5	5	0.8
LIV	EC		0	0	0	2	0	0	2	0.3
LIV	HU		0	0	40	0	0	0	40	6.7
LIV	NL		0	50	140	297	355	348	1190	198.3
LIV	SG		0	0	0	0	0	10	10	1.7
LIV	SR		350	709	625	746	1568	1444	5442	907.0

CONSERVATION MEASURES

Brazil: the export of all wildlife has been prohibited since 1967 (Lei 5197, 1967 and Portaria 3481, 1973) (Anon., 1987).

French Guiana: *D. tinctorius* is protected under Article 2 of the Decree of 15 May 1986 (establishing protection measures for reptiles and amphibians that occur in the department of Guyana (French Guiana) throughout the whole national territory or part of it [Official Journal of June 25, 1986]) which states that 'The stuffing or the peddling, the use, the offering for sale, the sale or purchase of dead or live specimens of the reptile and amphibian species mentioned hereunder is prohibited at all time throughout the national territory. Transport of specimens is prohibited at all time throughout the national territory except in the department of Guyana (French Guiana) from which they cannot be however exported' (F. André, *in litt.* to TRAFFIC Europe, 1999).

No *in-situ* management programmes are known (Scales, 1998). Durham University French Guiana Rainforest Amphibian Project (United Kingdom) is planning to continue monitoring amphibian populations, including *D. tinctorius*, in the Saül area (Scales, 1998).

Guyana: export quotas of 100 *D. tinctorius* were set for 1997 and 1998 (CITES Notification Nos. 994; 1998/36).

Suriname: export quotas of 1,886 *D. tinctorius* per year were set from 1995 to 1998 (CITES Notification Nos. 874; 916; 994; 1998/36).

CAPTIVE BREEDING

There were no specimens exported by range states declared as captive-bred. Virtually all of the specimens exported or re-exported by non-range states were reported to be of captive-bred origin.

de Vosjoli and McKeown (1997) state that most *D. tinctorius* sold in the pet-trade are captive-bred; and that several morphs are now available from breeders and dealers on a regular basis. According to Kelley (1998), *D. tinctorius* is commonly available from USA and European breeders, with new morphs introduced each year.

There is no available material on the viability of captive-bred *Dendrobates* stocks. It has been suggested that after a few generations captive populations of *Dendrobates* spp. tend to collapse necessitating the collection of further wild individuals (Anon., 1987). Captive-bred specimens of *Dendrobates* spp. appear to produce few or no skin toxins (Kelley, 1998; Heselhaus, 1992).

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Epipedobates tricolor (Boulenger, 1899)

Phantasmal Poison Frog
Rana de punta de flecha tricolor

Order: ANURA

Family: DENDROBATIDAE

SUMMARY

Restricted to tropical dry forest on the Pacific side of the Andes of northeastern South America. There is very little information on the specific habitat requirements and distribution of the species; there appear to be no population estimates. Habitat loss has been recorded as a threat to *E. tricolor*. The majority of specimens recorded entering international trade between 1991 and 1996 are reported to have originated in Ecuador and were declared captive-bred. The captive-breeding operation in Ecuador is reported to have closed in 1998 and further exports prohibited. *E. tricolor* is reported to be one of the easier poison-arrow frogs to breed in captivity. The recorded international trade in *E. tricolor* appears to be at a low level and is presumed not to currently have a significant impact on wild populations.

The species is recommended under Decision 10.79 for inclusion in category d) iii.

DISTRIBUTION AND POPULATION

Restricted to the Pacific side of the Andes of northeastern South America. Population data are scarce. *Epipedobates* species are difficult to census because of their size and tendency to conceal themselves (Anon., 1987).

Ecuador: southeastern Provincia Bolívar and western Provincia Azuay (Duellman and Wild, 1993).

Peru: Departamento Piura and Departamento Tumbes (Duellman and Wild, 1993).

There is little information available on intraspecific variation. Kelley (1998) mentions that many *E. tricolor* morphs are being bred by hobbyists in the USA.

HABITAT AND ECOLOGY

E. tricolor is a small, diurnal, and terrestrial frog that inhabits tropical dry forest on the Pacific side of the Andes (below 1,700 m); animals are most often encountered near streams and other watercourses. Males are known to be territorial, but home range size is unclear. There are few details on the reproduction of *E. tricolor*. In captivity approximately 30 eggs are deposited by the female in a 'spawning cave'; presumably wild specimens oviposit on leaf litter. Captive females are prolific and may spawn several times a year (Heselhaus, 1992; Zimmermann and Zimmermann, 1994). After oviposition the male cares for the egg clutch until hatching (10 to 14 days) upon which the tadpoles are transferred to nearby streams (Heselhaus, 1992; Duellman and Wild, 1993). Sexual maturity is reached at around 9 months; a longevity of 13 years has been recorded in captivity (Zimmermann and Zimmermann, 1994).

THREATS TO SURVIVAL AND DOMESTIC USE

Habitat loss remains the principal threat to *Epipedobates* species (Zimmermann and Zimmermann, 1994).

Ecuador: Duellman and Wild (1993) commented that much of the tropical dry forest of the Cordillera de Huancabamba (where *E. tricolor* has been recorded) has been cleared for agriculture and pasture.

There is no known local use of the species.

INTERNATIONAL TRADE

Reported international trade in *E. tricolor* over the period 1991 to 1996 was entirely of live animals, mostly exported by Ecuador, presumably for the herpetological pet market. From 1991 to 1993

international trade appears to have been restricted to small transactions of captive-bred specimens between non-range states: following 1993 the majority of *E. tricolor* reported in trade (approximately 3,500 animals) were declared as captive-bred specimens, originating in Ecuador, and exported directly to the USA. All commercial exports of wild fauna from Ecuador are banned (CITES Notification No.306), however in 1995 and 1996 the USA reported imports of wild animals of Ecuadorian origin (70 and 120 frogs respectively). There were no exports reported by Peru.

The USA accounted for approximately 85% of recorded imports in 1994, 100% in 1995, and about 75% in 1996; over this period much smaller proportions of *E. tricolor* were exported from Ecuador to Belgium and Germany. From 1993 the trade in captive-bred specimens between non-range states grew steadily. The majority of these (approximately 235 animals) were exported from the Netherlands to the USA. During 1996 there was a single large transaction of 100 declared captive-bred *E. tricolor* from the Czech Republic to Italy. No *E. tricolor* were reported as imports to the Czech Republic during the period 1991 to 1996. The skin toxins produced by *E. tricolor* have been used in medical research for the development of certain pain-killers (Anon., 1998). There were no illegal imports or exports recorded in CITES annual reports.

During 1998/1999 *E. tricolor* was advertised on the internet by dealers in the Netherlands at NGL40-45 (US\$21-23) per frog; over the same period the average price in France was 290FF (US\$50) per frog, and in Canada was advertised at CAD\$45 (US\$30). There were no details as to the provenance of specimens offered.

Gross exports of *Epipedobates tricolor*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	Total	Average
LIV		CZ	0	0	0	0	0	100	100	16.7
LIV		DE	6	30	0	0	0	0	36	6.0
LIV		EC	0	0	0	813	1338	1350	3501	583.5
LIV		HU	0	0	60	0	0	0	60	10.0
LIV		NL	0	13	39	10	105	80	247	41.2
LIV		US	0	0	13	22	30	45	110	18.3
			6	43	112	845	1473	1575	4054	675.7

CONSERVATION MEASURES

Ecuador: all commercial exports of wild fauna are banned (CITES Notification No.306).

No direct conservation measures are known. Further field studies are required to determine the global population status of *E. tricolor*.

CAPTIVE BREEDING

Apparently one of the easier poison arrow frogs to breed in captivity. *E. tricolor* is considered by herpetological hobbyists to be prolific and suitable for beginners (Heselhaus, 1992).

Ecuador: the majority of specimens reported as exports between 1994 and 1996 were declared to be captive-bred. The only captive-breeding centre for Dendrobatid frogs in Ecuador is reported to have closed in April 1998 (X. Buitron *in litt.* to TRAFFIC International, 1999).

Trade in declared captive-bred specimens of *E. tricolor* between non-range states grew steadily after 1991. There is no available material on the viability of captive bred *Epipedobates* stocks. It has been suggested that after a few generations captive populations of *Epipedobates* spp. tend to collapse necessitating the collection of further wild individuals (Anon., 1987). Captive-bred specimens of *Epipedobates tricolor* appear to produce few or no skin toxins (Kelley, 1998; Heselhaus, 1992).

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Hoplobatrachus tigerinus (Daudin, 1802)
(syn. *Rana tigerina*)

Indian Bullfrog
Grenouille tigre

Order: ANURA

Family: RANIDAE

SUMMARY

The global distribution of this frog species is unclear. Available information indicates that *H. tigerinus* is confined to the Indian sub-continent and Sri Lanka; east of Myanmar *H. tigerinus* seems to be replaced by *H. rugulosus* (which is not listed in the CITES Appendices). There is little information available on exact population sizes; in some range states *H. tigerinus* has been described as 'very common'. From 1993 there were no recorded exports of *H. tigerinus* meat from range States, with exports from Bangladesh in 1991-1992 reported to be a clearance of old stock. Exports reported from non-range States, including all recorded post-1992 exports, are suspected to be of *H. rugulosus*. It therefore appears that international trade does not impact negatively on *H. tigerinus*. A further review of the frog leg trade from South and South-East Asia to confirm the species in trade, their status and levels of captive breeding and ranching is warranted.

The species is recommended under Decision 10.79 for inclusion in category d) iii.

DISTRIBUTION AND POPULATION

Widely distributed in the Indian sub-continent (as far east as Myanmar) and Sri Lanka; introduced in Madagascar. There is little information available on the population status of *H. tigerinus*.

Some confusion has arisen over the eastern limits of the species range. *Hoplobatrachus tigerinus* (formerly *Rana tigerina*) has in the past been considered conspecific with *H. rugulosus* (*Rana rugulosa*), which occurs to the east of the range of *H. tigerinus*, in south-east and east Asia. Frost (1985), the taxonomic standard for amphibians adopted by CITES, recognises the two as distinct species but gives the range of *H. tigerinus* as encompassing that of *H. rugulosus*, apparently in error (Zhao and Adler, 1993; van Dijk *in litt.*, 1999). *H. rugulosus* is not listed in the CITES Appendices.

Bangladesh: occurs in all districts, except in immediate coastal areas (Fugler, 1983). Reported to be very common and widespread (Khan, 1982). The greatest population densities occur in the Districts of Mymensingh and Sylhet, and the species is less frequently encountered in the Chittagong Hill Tracts and coastal areas. Fugler (1983) considered that the wild stock was 'seriously stressed by over-exploitation'. An investigation conducted by the Forest Department in 1990 and 1991 estimated the mean density of 33.38 individuals of '*Rana tigerina*' per hectare (Md. Ghulam Habib *in litt.* to TRAFFIC India, 1999).

India: recorded in the states of Tamil Nadu (Murthy, 1977), Orissa (Dutta, 1990), Himachal Pradesh (Dubois, 1980), Maharashtra (Gnanasekar, 1986), Karnataka (Kanamadi *et al.*, 1990) and in the north-east (Chanda, 1990). Total population figures are unknown. Common in the State of Orissa (Dutta, 1990).

[**Madagascar:** introduced (Frost, 1985; Glaw and Vences, 1994) (although it should be confirmed that this population is indeed *Hoplobatrachus tigerinus* rather than *H. rugulosus*.].

Myanmar: Frogs conforming to *Hoplobatrachus tigerinus* (rather than *H. rugulosus*) have been reported as occurring in upper Myanmar (Smith, 1940 in P.P. van Dijk *in litt.* to IUCN/SSC Wildlife Trade Programme, 1999).

Nepal: found in the west, east and central regions, but not in the north-west (Dubois, 1980).

Pakistan: very common in the northern hilly tracts of Punjab and Azad Kashmir (Khan, 1979). Occurs in the Himalayas in Jammu and Kashmir (Dubois, 1980). An indication of the population density comes from Khan (1979), who reported that the species was found in every water body in Rawalpindi, Manshera, Kotli and Goi, and also in Islamabad.

Sri Lanka: present (Frost, 1985; P.P. van Dijk *in litt* to IUCN/SSC Wildlife Trade Programme, 1999).

[Populations reported from Cambodia, People's Republic of China, People's Republic of, Lao PDR, Western (Peninsular Malaysia, Taiwan, Thailand and Viet Nam recorded by Frost (1985) would appear to be assignable to *H. rugulosus* and not to *H. tigerinus* (Zhao and Adler, 1993; van Dijk *in litt.*, 1999).]

HABITAT AND ECOLOGY

H. tigerinus is mainly aquatic, inhabiting mostly freshwater wetlands, both natural and artificial (especially paddy fields). It is absent or uncommon in forested areas and coastal regions (Fugler, 1983). In Nepal *H. tigerinus* is found in the lower tropical region from 0-500 m; the higher tropical zone 500-1000 m and the subtropical region from 1000-2000 m. It reaches the cooler subtropical altitudes in cultivated valleys such as the Kathmandu Valley (Dubois, 1976). The species is mostly solitary and nocturnal; inhabiting holes and bushes near permanent water courses and pools (Dutta, 1990). Its diet includes invertebrates, small mammals and birds. In India breeding takes place during the monsoon season (Kanamadi *et al.*, 1990), when *H. tigerinus* congregates near ephemeral rainwater pools. There is little available material on reproduction. P.P. van Dijk (*in litt.* to IUCN/SSC Wildlife Trade Programme, 1999) has reported that *H. tigerinus* produces large numbers of eggs (and so has potentially high levels of recruitment), but that there are high mortality rates among tadpoles, froglets and adult frogs.

THREATS TO SURVIVAL AND DOMESTIC USE

Water pollution by pesticides and other agrochemicals is considered to be a potential threat to *H. tigerinus* and other frog species (Gan, 1994; P.P. van Dijk *in litt* to IUCN/SSC Wildlife Trade Programme, 1999).

Bangladesh: domestic demand for frogs as food is very low owing to religious constraints as frogs are not part of the Halal Muslim diet (Masri, 1987; P.P. van Dijk *in litt* to IUCN/SSC Wildlife Trade Programme, 1999)

India: *H. tigerinus* is used as a protein-rich food by several tribal communities in north-eastern India (Roy, 1997).

[China: reference to use of '*R. tigerina*' in China (e.g. Li *et al.*, 1996) is more likely to refer in fact to local populations of *Hoplobatrachus rugulosus* (*Rana rugulosa*).]

[Viet Nam: the domestic demand for frogs as food is reported to be greater than international demand (TRAFFIC Southeast Asia *in litt.* to TRAFFIC International, 1999).]

INTERNATIONAL TRADE

Hoplobatrachus tigerinus are traded internationally for their legs, which are a food product popular in North America and Europe. There is negligible trade in other products. Previously there was some confusion as to the volume of meat in trade. This resulted from trade being reported in a number of different units. Since August 1992, Parties have been requested to report trade in frogs' legs in a standard unit of weight (kg) (CITES Notification No. 668).

Between 1991 and 1996 approximately 2,240,000 kg of meat reported as *H. tigerinus* was recorded in trade in CITES Annual Report data (but see below).

Reported trade peaked in 1992 with just over one million kg of meat recorded in CITES annual report data, virtually all as exports from Bangladesh. Following 1992 exports were stopped from Bangladesh and the quantity of meat reported in trade declined substantially. [The reported export of 2,245 kg of wild source meat of Bulgarian (ISO code BG) origin to the USA from Canada during 1992 is probably erroneous. It is presumed that this meat was of Bangladeshi (ISO code BD) origin. The reported import of 691 kg of live *H. tigerinus* of pre-Convention origin by the USA from Ecuador may also be a misidentification.]

Since 1992, no trade recorded as *Hoplobatrachus tigerinus* has been recorded in CITES annual reports as originating in any country known to have wild populations of this species. However, substantial quantities of frog meat declared as *H. tigerinus* but originating in countries known or suspected to have wild populations of *H.*

rugulosus have been reported in CITES annual reports, notably in 1996 when the USA reported imports of ~140,000 kg of meat from Viet Nam (~15,000 kg of declared captive-bred source) and ~70,500 kg of meat from Hong Kong (reportedly of Vietnamese origin, Hong Kong did not report any imports from Viet Nam).

Recent information on the distribution of *H. tigerinus* suggests that exports from Viet Nam are captive-bred frogs (possibly *H. rugulosa*) mis-identified as *H. tigerinus* (see Distribution and Captive Breeding sections).

Imports to the USA have accounted for over 90% of legal trade for 1991-1996. During this period the Netherlands and Canada also imported notable quantities, much of which appears to have been re-exported to the USA.

During 1993 the USA recorded in its CITES Annual Report the seizure of illegal *H. tigerinus* meat from China (unit not given). The CITES Management Authority of China have no record of this transaction (Fan Zhiyong *in litt.* to WCMC, 1999). In 1993 France reported the seizure of 800 cartons of illegal *H. tigerinus* meat of Vietnamese origin. The Czech Republic reported the seizure of five shipments of illegal meat from Denmark in 1993. In 1994 the USA reported the seizure of 21,247 kg of meat of Vietnamese origin.

Gross exports of *Hoplobatrachus tigerinus*

TER	UNI	CTR	1991	1992	1993	1994	1995	1996	total	Average
M	T	Y								
BOD		CN	0	1	1	0	0	0	2	0.3
LIV	KG	EC	0	0	0	0	691	0	691	115.2
LIV	KG	MY	0	0	220	0	0	0	220	36.7
MEA		CN	0	0	1420	0	0	0	1420	236.7
MEA	CAR	VN	0	0	800	0	0	0	800	133.3
MEA	KG	BD	951858	1057832	0	0	0	0	2009690	334948.3
MEA	KG	CA	21628	37370	0	0	0	0	58998	9833.0
MEA	KG	HK	0	0	0	0	0	70547	70547	11757.8
MEA	KG	NL	20356	0	0	0	0	0	20356	3392.7
MEA	KG	TH	0	0	2	0	0	0	2	0.3
MEA	KG	US	0	37269	0	0	0	0	37269	6211.5
MEA	KG	VN	0	0	0	21247	88	139536	160871	26811.8
SPE		IN	0	10	0	0	0	0	10	1.7

Note: the unshaded rows in the table indicate records involving known or previously reported range states.

CONSERVATION MEASURES

Bangladesh: the Bangladesh Wildlife (Preservation) (Amendment) Act 1974, is the only regulation which governs export and import of wildlife in Bangladesh (S.M. Lutfallah *in litt.* to TRAFFIC India, 1999; Md. Ghulam Habib *in litt.* to TRAFFIC India, 1999). '*Rana tigerina*', *Rana hexadactyla* and *Rana limnocharis* are included in Part-1 of the First Schedule of this Act; and so, export of froglegs was permitted as per provisions of the Act. The Government also imposed a ban on capture of wild frogs and processing of froglegs during the breeding season from 15th April to 15th July. CITES export permits were issued for every consignment of froglegs (Md. Ghulam Habib *in litt.* to TRAFFIC India, 1999). The legal export of frogs legs from Bangladesh was banned in 1989 on the advice of a Government Committee. However, during 1991 and 1992 exports were allowed in order to clear old stock (Md. Ghulam Habib *in litt.* to TRAFFIC India, 1999; S.M. Lutfallah *in litt.* to TRAFFIC India, 1999; R. Ahmed *in litt.* to IUCN/SSC Wildlife Trade Programme, 1999). Presently no trade in '*Rana tigerina*' is carried out (Md. Ghulam Habib *in litt.* to TRAFFIC India, 1999).

India: the Government of India has banned the export for commercial purposes of all animal specimens included in CITES Appendix II (as of 4 September 1996) (this includes *H. tigerinus*) (CITES Notification No. 930).

[China: '*Rana tigerina*' (Chinese: Hu Wen Wa) is listed as a Class II protected species in China's Wild Animal

Protection Law (1988). Catching or hunting of wildlife under Class II protection requires a special licence. The sale and purchase of wildlife under special state protection or the products thereof is prohibited. As a CITES Appendix II-listed species, the export and import must be approved by the CITES Management Authority (CITES Management Authority of the People's Republic of China, 1995).

Zhao and Adler (1993) stated that '*R. tigerina*' (now *H. tigerinus*) is not-native to China; they explain that all Chinese populations previously assigned to '*R. tigerina*' are now recognised to be '*R. rugulosus*' (now *H. rugulosus*).]

[Taiwan: *Hoplobatrachus* (*Rana*) *tigerinus* is listed as Protected Wildlife (in the category of "rare and valuable species") under the Wildlife Conservation Law (WCL). Captive animals (such as under zoo care) are also regulated by the WCL. According to the WCL, protected species and their products shall not be traded, imported or exported unless under special circumstances recognised in the WCL or related legislation. The WCL also stipulates that no import or export of live wildlife or products of Protected Wildlife are allowed without prior approval from the central government authority. The import or export of live specimens of Protected Wildlife are limited to academic research institutes, colleges or universities, public or licensed private zoos for education or academic research and circus performances (Council of Agriculture, Taiwan, *in litt.* to TRAFFIC East Asia, 1999). [Note that *Hoplobatrachus* populations in Taiwan are almost certainly assignable to *H. rugulosus* (P.P. van Dijk *in litt.* to IUCN/SSC Wildlife Trade Programme, 1999).]

[Viet Nam: the export of *H. tigerinus* under the jurisdiction of the Ministry of Fisheries. The Fisheries Resources Conservation Department issues certificates authorising companies to export frogs and frog legs (TRAFFIC Southeast Asia *in litt.* to TRAFFIC International, 1999). Only captive-bred animals may be exported (Ha Thi Tuyet Nga, *in litt.* to TRAFFIC Southeast Asia, 1999).]

CAPTIVE BREEDING

Bangladesh: there is no captive-breeding (Md. Ghulam Habib *in litt.* to TRAFFIC India, 1999).

Taiwan: there may be some captive breeding facilities for *H. tigerinus* in Taiwan for local consumption (Council of Agriculture, Taiwan, *in litt.* to TRAFFIC East Asia, 1999).

Thailand: Pariyanonth and Daorerk (1995) gave a generalised report on recent farming techniques for the 'local species' '*Rana tigerina*', '*R. rugulosa*' and the non-native *R. catesbeiana*. They described the successful commercial captive-breeding and rearing of these species using induced spawning and commercially pelleted food in both semi-natural and artificial (concrete tanks) systems. They state that these three species are commonly farmed in Thailand.

Viet Nam: there are reported to be thousands of captive breeding farms for '*R. tigerina*', although no exact information is available (Ha Thi Tuyet Nga, *in litt.* to TRAFFIC Southeast Asia, 1999; TRAFFIC Southeast Asia *in litt.* to TRAFFIC International, 1999). During 1996 the USA recorded in its CITES Annual Report the import of ~15,000 kg declared captive-bred *H. tigerinus* meat from Viet Nam.

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Mantella aurantiaca Mocquard, 1900

Golden Mantella
Rana dorada
Mantella dorée

Order: ANURA

Family: RANIDAE

SUMMARY

A small, brightly coloured terrestrial frog found only in the rain-forests of eastern Madagascar above around 900 m altitude, popular with collectors of amphibians particularly in Europe and North America. The only well-known population is small. Overall limits of range and population levels are poorly known although the species is believed threatened by habitat destruction and, possibly, overcollection for export. Classified as "Vulnerable" by IUCN. Listed in CITES Appendix II since 1995. Several thousand a year, all wild-collected, are known to have been exported at least since the early 1990s. Nearly 30,000 are recorded as exported in CITES annual reports for 1995 and 1996, with numbers in 1996 substantially higher than in 1995. No quotas are known to have been set. Captive-breeding has occurred in Europe and North America but numbers reared are believed very low compared with imports from the wild.

The relatively high, evidently uncontrolled and apparently increasing level of exports is a source of concern. In the absence of any population figures it is however impossible to determine whether these exports are sustainable or not.

The species is recommended under Decision 10.79 for inclusion in category d) ii.

DISTRIBUTION AND POPULATION

Endemic to Madagascar.

Madagascar Apparently restricted to eastern central rainforest areas above ca 900 m altitude (Glaw & Vences, 1994). The best known population was reported in 1992 as consisting of some 16 isolated sub-populations each with 20 to 160 calling males in an area (the Marais de Torotorofotsy) some 10 km northwest of Perinet-Andasibe (Zimmermann and Hetz, 1992; Zimmermann and Zimmermann, 1994). It has also been recorded from a number of other sites in the area, one some 60 km away from this population (IUCN Species Survival Commission and TRAFFIC Network, 1994; Glaw and Vences, 1994). The limits of its range are unknown although it is thought that it may occur at scattered localities over a fairly wide area (IUCN Species Survival Commission and TRAFFIC Network, 1994; Glaw *in litt.*, 1999; Jenkins and Rakotomanampison, 1994; Vences *et al.*, in press). A similar orange colour morph has been found in the Ihosy region (central-western Madagascar), although it is not certain that this is *M. aurantiaca* (Glaw and Vences 1994).

Using the figures quoted above, the adult male population of the Marais de Torotorofotsy would in the early 1990s have been somewhere between 320 and 2560. There is no information on sex ratios. The population of the species overall clearly is, or has been, considerably higher than this as evinced by export figures which indicate several thousand wild-collected individuals exported each year since the early 1990s (Jenkins and Rakotomanampison, 1994, and see below).

The species was classified by IUCN in 1996 as Vulnerable (criteria A1cd). There is widespread agreement (as reported in IUCN Species Survival Commission and TRAFFIC Network, 1994) that the species is declining in numbers, although this appears to be inferred from both declining habitat availability and the level of exploitation for the export trade.

Intraspecific variation is discussed under "Notes" below.

HABITAT AND ECOLOGY

M. aurantiaca appears restricted to -- or is most abundant in -- *Pandanus*-swamp areas in rainforest habitats. In the Marais de Torotorofotsy it is found no more than 250 m from water. It feeds on a range of small invertebrates. Breeding in the wild is reported to be seasonal, beginning in December and coinciding with the main part of the wet season which runs overall from November to April (Anon., 1994;

Blommers-Schlösser and Blanc, 1991). Clutches of 20-140 eggs are deposited in moist leaf litter. These hatch after 14 days and the tadpoles are washed into small pools by heavy rain. In captive conditions, tadpoles may metamorphose after a period of from 70 to 150 days. Captive animals reach maturity at around 12-14 months (Glaw and Vences, 1994; Staniszewski, 1998; Zimmerman and Zimmerman, 1994). Longevity in captivity has been recorded at eight years (Staniszewski, 1998).

THREATS TO SURVIVAL AND DOMESTIC USE

Loss of habitat, through deforestation and conversion of *Pandanus*-swamps to paddy fields, and collection for trade were identified in 1994 as important threats (Anon., 1994; IUCN Species Survival Commission and TRAFFIC Network, 1994). The impact of collecting remains unknown.

Local use appears restricted to collection of individuals to show to tourists, who are charged a fee to take photographs. At Andasibe this has led to specimens being translocated from their natural habitat, which is not easily accessible, to easily accessible locations where the species does not naturally occur (Glaw *in litt.*, 1999).

INTERNATIONAL TRADE

Mantella aurantiaca was included in Appendix II of CITES in 1995.

International trade in *M. aurantiaca* appears to be exclusively in live animals for the herpetological pet trade. Virtually all CITES-recorded trade is accounted for by exports from Madagascar, the range state. Recorded exports from other countries are negligible. The USA is by far the largest single importer, accounting for some 60% of recorded imports in 1995 and around 75% in 1996.

Legal exports of *M. aurantiaca* from Madagascar in the early 1990s (pre CITES listing) were believed to be in the region of 3,000-6,000 per year (Jenkins and Rakotomanampison, 1994). Export figures for the two years after the species was listed in CITES Appendix II (1995 and 1996), are much higher (just over 12,000 and just under 17,000 respectively). Either they reflect a genuine increase or they indicate that the previous figures are under-estimates. Given the structure of the Malagasy live animal export trade, discussed in Jenkins and Rakotomanampison (1994), it seems that the change probably reflects a combination of the two.

Wholesale F.O.B (free on board) prices in Madagascar in 1993 were US\$3-5 per frog (Jenkins and Rakotomanampison, 1994). Prices advertised in the USA during the early 1990s were in the region of US\$20-35. In the UK, prices ranged from £25 to £45 (US\$37.50-67.50) (IUCN Species Survival Commission and TRAFFIC Network, 1994). Information from dealers' lists for 1997 and 1999 (TRAFFIC North America *in litt.*, 1999) indicates that retail prices have remained virtually unchanged.

Gross exports of *Mantella aurantiaca*

TERM	UNIT	CTRY	1995	1996	Total	Average
BOD	MG	2	0	2	2	1.0
LIV	DE	0	10	10	10	5.0
LIV	JP	5	0	5	5	2.5
LIV	MG	12110	16767	28877	14438.5	
LIV	SG	0	10	10	10	5.0
LIV	SK	0	52	52	26.0	
LIV	TH	5	0	5	2.5	
LIV	US	49	118	167	83.5	

It is possible that some of the recorded export represents *Mantella* species other than *M. aurantiaca*; conversely some *M. aurantiaca* may have been exported under different names (see discussion under "Notes" below).

CONSERVATION MEASURES

As of 1994, this species was by default considered a game species in Madagascar (under Décret No. 61-096 of 1961 as amended by Décret No. 88-243 of 1988, which lists fully protected and pest species, and states that all species not so named are game). Collection of such species required a licence issued by the Direction des Eaux et Forêts, along with payment of a fixed tax per specimen collected. The open season for collection is 1 May to the first Sunday of October (Jenkins, 1994).

The species is not known to occur in any protected area.

CAPTIVE BREEDING

The species is known to be bred in captivity in Europe and North America (Bartlett, 1995). Females may lay every two months under ideal conditions (Staniszewski, 1998; Zimmerman and Zimmerman, 1994). It is unclear what proportion of trade is in captive-bred specimens, although indications are that it is not high. Glaw (*in litt.*, 1999) notes that captive-breeding of *Mantella* spp. in large numbers requires a great deal of effort. There is no evidence of captive breeding in Madagascar (Glaw *in litt.*, 1999; Jenkins and Rakotomanampison, 1994).

REMARKS

Taxonomy of *Mantella* species including *M. aurantiaca* is very confused at present. Many different varieties and intermediate forms between *M. aurantiaca*, *M. crocea*, and *M. milotympanum* are reportedly present in trade (Glaw *in litt.*, 1999). Allozyme and osteological studies apparently indicate that these three species are virtually identical from genetic and osteological viewpoints, indicating that they may be only colour morphs of one species (Glaw *in litt.*, 1999; Vences *et al.*, 1998a & b). However, there are reportedly chromosomal differences which may support their retention as separate species (Glaw *in litt.*, 1999; Pintak *et al.*, 1998; Vences *et al.*, in press).

In captivity, *M. aurantiaca* can hybridize with very differently coloured species such as *M. madagascariensis*. Hybrid offspring are similar in appearance to some apparently wild-collected morphs that have appeared in trade (Glaw, *in litt.*, 1999).

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Ornithoptera chimaera (Rothschild 1904)

Chimaera birdwing
Ornithoptère chimère

Order: LEPIDOPTERA

Family: PAPILIONIDAE

SUMMARY

A butterfly that is widely distributed in montane areas of Papua New Guinea and Irian Jaya, Indonesia. Its populations are related to the availability of the food plant *Aristolochia momandul*. In Papua New Guinea, as part of a ranching programme, the food plant has been widely propagated, and in localised areas where this has taken place there has apparently been a rapid increase in the numbers of this butterfly. Numbers reported in international trade rose rapidly during the period 1991-1996, all originating in Papua New Guinea. It is assumed that this is related to the success of the ranching operations and, although the ecological impact of this programme remains to be assessed, there is no evidence that international trade is adversely affecting populations of the species.

The species is recommended under Decision 10.79 for inclusion in category d (iii)

DISTRIBUTION AND POPULATION

Widely distributed through, yet ecologically restricted to, montane areas of Papua New Guinea and Irian Jaya. The species is likely to occur in any areas with fairly extensive mild montane forests above 1,500 m altitude (Hudson *in litt.* to TRAFFIC Oceania, 1999b).

Indonesia: *O. c. charybdis* is known from Irian Jaya, from the Wandammen Mountains on the east coast of the Vogelkop (Berau Peninsula) through the Weyland Mountains to an outlying locality in the Pergunungan Maoke (Snow Mountains). There is an outlying record of *O. c. chimaera*. (Collins and Morris, 1985).

Papua New Guinea: *O. c. chimaera* is widely distributed along the central cordillera and has been recorded from the Finisterre Mountains and those of the Huon Peninsula. Parsons (1991) considered that it was rare in the Bulolo-Wau valley.

No overall population estimates are available. The species believed to be restricted to one species of food-plant, *Aristolochia momandul*, and the density of larvae is low (Collins and Morris, 1985). Populations can reportedly quickly increase locally in response to planting of *Aristolochia momandul* in conjunction with ranching programmes (see 'Captive Breeding' below) (Hudson *in litt.* to TRAFFIC Oceania, 1999a).

Neither organisation currently ranching this species (the Insect Farming and Trading Agency IFTA and the Wau Ecology Institute Insect Ranch WEIIR, both in Papua New Guinea) has the resources to undertake general population monitoring or reportedly has plans to do so (Clark, *in litt.* to TRAFFIC Oceania, 1999a; Hudson, *in litt.* to TRAFFIC Oceania, 1999b). Both have stressed that in view of the extent of the species range and the often steep terrain such an undertaking would be unrealistic.

HABITAT AND ECOLOGY

Occurs in areas of tall but fairly open primary forest, often in moderately to very steep sided valleys along water courses at altitudes of between 1,200 m and 1,800 m (mainly between 1,600 m and 1,800 m) but has also been observed in altitudes ranging up to 2800 m (Hudson *in litt.* to TRAFFIC Oceania, 1999b). As far as is known, larvae only feed on one species of climbing plant, *Aristolochia momandul*, and population numbers directly reflect the availability of this species. *A. momandul* is very slow growing and prefers well-drained areas at higher altitudes (Hudson, *in litt.* to TRAFFIC Oceania, 1999a).

Like many birdwings, *O. chimaera* is a K-selected species, producing few, well-protected offspring compared with many other butterflies. Females may produce 6-10 eggs and range widely, apparently often in search of oviposition sites. The egg stage lasts 14 days, the larval stage probably about two months and the pupal stage for about 49-70 days (Collins and Morris, 1985).

THREATS TO SURVIVAL AND DOMESTIC USE

Collins and Morris (1985) expressed concern at the impact of fire (e.g. in the Wandamenn Mountains in Irian Jaya) and of increased logging (e.g. in the Weyland Mountains in Papua New Guinea) on the habitat of the species. However, Hudson (*in litt.* to TRAFFIC Oceania, 1999b) has noted that the steep topography of this species range makes the habitat, in general, difficult to exploit commercially.

Clark (*in litt.* to TRAFFIC Oceania, 1999b) notes that recent drought caused by El Niño climatic conditions appears to have had considerable impact on butterfly populations. However, he believes that villagers in some parts of Papua New Guinea have buffered populations of *O. chimaera* from decline as they have a financial interest in tending and watering the *A. momandul* food plants (see below).

Indonesia: *Ornithoptera* spp., including *O. chimaera*, have been observed for sale in Jakarta, where good quality specimens of *Ornithoptera* spp. were offered for IDR 100,000-150,000 (approximately US\$ 11-17) in 1999. It is believed likely that the species is also available in other large Indonesian cities (TRAFFIC Southeast Asia, *in litt.* to TRAFFIC International, 1999).

Papua New Guinea: There does not appear to be any significant domestic use of *O. chimaera* (Antram, *in litt.* to TRAFFIC Oceania, 1999). However, the species is ranched for export. IFTA and WEIR obtain specimens by instructing villagers on how to plant *A. momandul* and how to collect specimens so that they are suitable for trade purposes. Boxes of live pupae are bought from participating villages and then hung on pins on the wall until the imagines emerge. They are transferred to a small cage until their wings are fully extended and dry, and then killed by injection and set (Antram, *in litt.* to TRAFFIC Oceania, 1999).

There is no known documented assessment of the ecological impact of ranching activities (Antram, *in litt.* to TRAFFIC Oceania, 1999). With regard to the sustainability of harvests, Hudson, of the Wau Ecology Institute Insect Ranch, (*in litt.* to TRAFFIC Oceania, 1999a) comments that not all pupae are harvested as many are located high in the canopy and are therefore inaccessible to villagers. In general, the Insect Ranch accumulates around 100-200 pairs of a given butterfly species from villagers and then stops buying that species until the stock has been sold. The break may be up to six months long, theoretically allowing populations time to recover. Hudson also notes that some farmers providing specimens to the WEIR reportedly plant more than 1,000 *Aristolochia* plants, with the result that *Ornithoptera* populations may apparently increase dramatically in a short period of time once sufficient numbers of *Aristolochia* have become established (Hudson *in litt.* to TRAFFIC Oceania, 1999a).

The Manager of the Insect Farming and Trading Agency (IFTA) in Papua New Guinea has observed that the flooded export market has reduced prices, providing a form of harvest control (Clark *in litt.* to TRAFFIC Oceania, 1999b).

INTERNATIONAL TRADE

Gross trade reported from 1991-1996 amounted to 1,488 individuals, virtually all of which were reported as originating in Papua New Guinea. The numbers exported from Papua New Guinea increased from only 29 in 1991 to 1,074 in 1996. Only one export was reported as originating in Indonesia – imported to the USA from Canada in 1996. The source of animals in trade was generally unrecorded, although there are several records of captive-bred specimens in trade originating in Papua New Guinea. It seems probable that these are ranched specimens that have been misreported (see Captive-Breeding).

Gross exports of *Ornithoptera chimaera*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	Total	Average
BOD	AU		0	0	0	1	1	0	2	0.3
BOD	CA		0	0	0	0	5	8	13	2.2
BOD	DE		8	0	0	0	2	2	12	2.0
BOD	PG		19	53	38	40	209	1074	1433	238.8
BOD	SG		0	0	1	0	0	0	1	0.2
LIV	DE		10	0	0	0	2	0	12	2.0

LIV	PG	10	1	0	0	0	0	11	1.8
SPE	PG	0	0	0	0	0	4	4	0.7
SPE	US	0	0	0	0	0	2	2	0.3
UNS	PG	0	0	0	4	0	0	4	0.7

The export of *O. chimaera* from Papua New Guinea is carried out by two organisations, the Insect Farming and Trading Agency (IFTA) and Wau Ecology Institute Insect Ranch (WEIR). Clark (Manager of IFTA) states that the trade in *O. chimaera* consists primarily of dried paired (male and female) butterflies for international collectors, and more recently, as framed specimens for tourists (Clark *in litt.* to TRAFFIC Oceania, 1999b).

Prices vary with the size of specimens. Large dried pairs and specimens with unique aberrations provide the greatest returns with prices for the former reportedly currently lying in the range US\$150-200 in Europe. Specimens reared in Papua New Guinea are reportedly larger than specimens derived from Irian Jaya (Hudson *in litt.* to TRAFFIC Oceania, 1999b).

Live pupae are also exported for zoos and entomological theme parks. Such export apparently requires considerable effort although financial returns are relatively high, as a single specimen may reportedly fetch US\$50-100. Export from Papua New Guinea is apparently hindered by the lack of temperature-controlled transport and the mortality rates of transported live pupae are understood to be high (Hudson *in litt.* to TRAFFIC Oceania, 1999b). Hudson notes that the majority of this market appears to be supplied from Irian Jaya (Hudson *in litt.* to TRAFFIC Oceania, 1999b), although CITES Annual Report data do not show the export any *O. chimaera* from Indonesia.

IFTA and WEIR believe that ranching of this species has been highly successful, noting however, that increased exports of *O. chimaera* appear to have quickly flooded the international collectors' market, resulting in a considerable drop in prices. Both organisations believe the key problem with trade in *O. chimaera* to be maintaining long-term market viability given the ease in ranching and overproduction (Clark *in litt.* to TRAFFIC Oceania, 1999b; Hudson *in litt.* to TRAFFIC Oceania, 1999b).

Illegal trade of insects from Papua New Guinea is suspected, involving residents and overseas traders exporting specimens without permits (Clark, *in litt.*, to TRAFFIC Oceania, 1999a).

CONSERVATION MEASURES

Indonesia: Wild specimens are reportedly banned from commercial capture and export (Anon., 1993). The species is protected by Decree of Ministry of Agriculture No. 576/Kpts/Um/8/1980, Decree of Ministry of Agriculture No. 716/Kpts/Um/8/1980 and Act No. 5 of 1990 regarding Conservation of Natural Resources and its Ecosystem; followed by Decree of Ministry of Forestry No. 301/Kpts-11/1991 of 10 June 1991, and Decree of Ministry of Forestry No. 882/Kpts-11/1992 of 8 September 1992 (TRAFFIC Southeast Asia *in litt.* to TRAFFIC International, 1999). No export quotas for specimens of this species were issued in the period 1995-1999.

Papua New Guinea: Listed as Protected under the Fauna (Protection and Control) Act of 1976. Protected species can only be taken for traditional purposes and, consequently, they are effectively prohibited from commercial use. However, Section 29 of the Act allows the Minister to permit protected species to be taken for "specific purposes". Since 1987, this provision has been used to allow certain protected birdwings to be traded commercially. A later Notice under Section 29 (Taking of Protected Animal for Special Purpose) was gazetted in 1990 which allowed the farming and export of farmed *O. chimaera* specimens (Antram, *in litt.* to TRAFFIC Oceania, 1999). The term 'farmed' is not defined but, as other conditions require the release of a percentage of adult specimens to the wild to maintain viable breeding populations, and the setting-aside of natural habitat for conservation of the species, the inference is that the butterflies should be bred in captivity. Two organisations have been granted permission to export these species, IFTA and WEIR (Antram, *in litt.* to TRAFFIC Oceania, 1999). This legislation allows the IFTA and WEIR to self-determine the appropriate percentages of adults released and monitoring. Antram (*in litt.* to TRAFFIC Oceania, 1999) questions the regularity that organisations such as WEIR and IFTA inspect the village ranching communities to ensure the release of a percentage of adult stock.

No export limits have been set by the Papua New Guinea Office of Environment and Conservation for exporters of *O. chimaera*. As a CITES-listed species, export is subject to control under the International Trade (Fauna and Flora) Act of 1983 (Antram, *in litt.* to TRAFFIC Oceania, 1999).

As noted above, planting of the larval food plant *Aristolochia momandul* may reportedly allow rapid local increase of populations of *O. chimaera*. However, no quantitative assessment of the effects of such supplementary planting appears to have been carried out.

New and Collins (1991) recommended that reserves should be established at Telefomin, Bundi, Naniwe Mission, Tapini-Woitape and Central Huon.

CAPTIVE-BREEDING

Indonesia: No information.

Papua New Guinea: *O. chimaera* is not currently known to be captive-bred in Papua New Guinea. IFTA has reportedly carried out captive-breeding trials, but found the results produced smaller inferior butterflies (Clark *in litt.* to TRAFFIC Oceania, 1999b). The species is currently ranched by the Insect Farming and Trading Agency (IFTA) and the Wau Ecology Institute Insect Ranch (WEIIR).

With regard to ranching, exporters obtain specimens by instructing villagers on planting *Aristolochia momandul* and collecting specimens that are suitable for trade purposes. Boxes of live pupae are bought from participating villages and then hung on pins on the wall until the imagines emerge. They are transferred to a small cage until their wings are fully extended and dry, and then killed by injection and set (Antram *in litt.* to TRAFFIC Oceania, 1999).

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Ornithoptera goliath Oberthür 1888

Goliath Birdwing
Ornithoptere goliath

Order: LEPIDOPTERA

Family: PAPILIONIDAE

SUMMARY

A butterfly that occurs in Indonesia (Seram, Waigeo, Irian Jaya) and Papua New Guinea. It is widely distributed in New Guinea and population numbers are related to the availability of its food plant, *Aristolochia crassinervia*. Populations reportedly increase rapidly in response to planting the food plant. Reported international trade during the period 1991-1996 amounted to 13,181 dead specimens and 2,674 live specimens, with roughly equal numbers originating in Indonesia and Papua New Guinea. Numbers in trade increased rapidly during the period to a peak in 1996, presumably as a result of the success of the ranching operations. There is no evidence that international trade is adversely affecting wild populations of the species.

The species is recommended under Decision 10.79 for inclusion in category d (iii).

DISTRIBUTION AND POPULATION

Occurs in Indonesia and Papua New Guinea. Evidently widespread on New Guinea and some associated islands.

Indonesia: Recorded from Seram, Waigeo and Irian Jaya. In the latter generally distributed along the northern side of the central mountain ranges (Collins and Morris, 1985; D'Abrera, 1975).

No overall population figures are available. However, it was noted that the species started to appear in abundance once its food plant was planted in semi-natural butterfly farming by residents around Arfak reserve (a co-operative venture involving WWF Indonesia (WWF/IP), Yayasan Bina Lestari Bumi Cendrawasih [an NGO established with WWF/IP assistance] (YBLBC), the Directorate-General of Forest Protection and Nature Conservation (PHPA) and local communities) (D. Neville *in litt.* to IUCN/SSC Trade Programme, 1999; Muskita, 1995).

Papua New Guinea: Generally distributed on the northern side of the central mountain ranges of the island of New Guinea, but at the Huon Peninsula it also crosses the ranges near the Markham River and intrudes deep into the foothills of the Bowutu Mountains, and possibly further south; also recorded from Goodenough Island (Collins and Morris, 1985; D'Abrera, 1975). Noted by Clark (*in litt.* to TRAFFIC Oceania, 1999a) as widespread but generally scarce. Their population numbers directly reflect the availability of their specific larvae food plant *Aristolochia crassinervia* and populations can reportedly rapidly increase in response to planting of this species (Hudson, *in litt.* to TRAFFIC Oceania, 1999a).

Neither organisation currently ranching this species (the Insect Farming and Trading Agency IFTA and the Wau Ecology Institute Insect Ranch WEIIR, both in Papua New Guinea) has the resources to undertake general population monitoring or reportedly has plans to do so (Clark, *in litt.* to TRAFFIC Oceania, 1999a; Hudson, *in litt.* to TRAFFIC Oceania, 1999b). Both have stressed that in view of the extent of the species range and the often steep terrain, such an undertaking would be unrealistic.

D'Abrera (1975) recognised two subspecies: *O. g. procus* from Seram and the nominate form from the remainder of the range.

HABITAT AND ECOLOGY

Prefers good secondary forest or primary forest along watercourses where *A. crassinervia* grows (Hudson *in litt.* to TRAFFIC Oceania, 1999a). *A. crassinervia* takes approximately 18 months to 2 years to grow to a size that is capable of enduring infestation by *O. goliath* larvae. The ecological specialisation for *A. crassinervia* makes the species attractive for butterfly ranching (TRAFFIC Oceania *in litt.* to TRAFFIC International, 1999).

THREATS TO SURVIVAL AND DOMESTIC USE

There does not appear to be any significant domestic use of *O. goliath* in Papua New Guinea (Antram, *in litt.* to TRAFFIC Oceania, 1999).

Ornithoptera spp., including *O. goliath*, have been observed for sale in Jakarta, where good quality specimens of *Ornithoptera* spp. were offered for IDR 100,000-150,000 (approximately US\$ 11-17) in 1999. It is believed likely that the species is also available in other large Indonesian cities (TRAFFIC Southeast Asia, *in litt.* to TRAFFIC International, 1999). The *Surabaya Post* of 30 January 1996 reported on the illegal catching of butterflies using expired illegally obtained permits from the Indonesian Department of Forestry. The accused sold mounted specimens of *O. goliath* in 1996 to a businessman from Jakarta for IDR 75,000 (approximately US\$ 8) per specimen (TRAFFIC Southeast Asia, *in litt.* to TRAFFIC International, 1999).

There is no known documented assessment of the ecological impact of ranching activities (Antram, *in litt.* to TRAFFIC Oceania, 1999). With regard to the sustainability of harvests, Hudson of the Wau Ecology Institute Insect Ranch, (*in litt.* to TRAFFIC Oceania, 1999a) comments that not all pupae are harvested as many are located high in the canopy and are therefore inaccessible to villagers. In general, the Insect Ranch accumulates around 100-200 pairs of a given butterfly species from villagers and then stops buying that species until the stock has been sold. The break may be up to six months long, theoretically allowing populations time to recover (Hudson *in litt.* to TRAFFIC Oceania, 1999a). Hudson also notes that some farmers providing specimens to the WEIR reportedly plant more than 1,000 *Aristolochia* plants, with the result that *Ornithoptera* populations may apparently increase dramatically in a short period of time once sufficient numbers of *Aristolochia* have become established (Hudson *in litt.* to TRAFFIC Oceania, 1999a).

The Manager of the Insect Farming and Trading Agency (IFTA) in Papua New Guinea has observed that the flooded export market has reduced prices, providing a form of harvest control (Clark *in litt.* to TRAFFIC Oceania, 1999b).

Clark noted (*in litt.* to TRAFFIC Oceania, 1999b) that the recent drought caused by El Nino climatic conditions have had considerable impact on butterfly populations. However, he believes that villagers have buffered populations of *O. goliath* from decline in certain areas as they have a financial interest in tending and watering the *A. crassinervia* food plants.

INTERNATIONAL TRADE

Gross international trade reported to CITES from 1991-1996 totalled 13,181 whole dead specimens and 2,764 live specimens. Trade increased rapidly during the period, with very few exports reported in 1991 and over 5,500 in 1996. The two range States were equally involved in exporting the species: Indonesia (46%) and Papua New Guinea (51%). The main importing countries were Japan and Germany.

Gross exports of *Ornithoptera goliath*

TAXON	TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	Total	average
Ornithoptera goliath	BOD	AU	0	0	0	0	0	0	26	26	4.3
Ornithoptera goliath	BOD	CA	0	0	2	12	141	45	200	33.3	
Ornithoptera goliath	BOD	CH	0	0	0	0	0	2	2	0.3	
Ornithoptera goliath	BOD	DE	1	0	30	9	16	60	116	19.3	
Ornithoptera goliath	BOD	DK	0	0	30	0	0	0	30	5.0	
Ornithoptera goliath	BOD	FR	0	0	0	0	2	0	2	0.3	
Ornithoptera goliath	BOD	GB	0	0	0	20	40	0	60	10.0	
Ornithoptera goliath	BOD	ID	0	14	292	991	2018	2647	5962	993.7	
Ornithoptera goliath	BOD	PG	8	465	1112	1155	2088	1261	6089	1014.8	
Ornithoptera goliath	BOD	SG	0	0	16	131	4	0	151	25.2	
Ornithoptera goliath	BOD	US	14	0	28	3	18	1	64	10.7	
Ornithoptera goliath	LIV	DE	0	0	0	0	16	0	16	2.7	
Ornithoptera goliath	LIV	GB	0	0	0	0	30	0	30	5.0	
Ornithoptera goliath	LIV	ID	0	160	0	100	100	0	360	60.0	

Ornithoptera goliath	LIV	PG	0	2	0	16	514	1455	1987	331.2
Ornithoptera goliath	SPE	CA	0	0	0	0	0	10	10	1.7
Ornithoptera goliath	SPE	DE	0	0	0	0	0	2	2	0.3
Ornithoptera goliath	SPE	ID	0	0	0	0	0	91	91	15.2
Ornithoptera goliath	SPE	PG	0	0	0	0	0	8	8	1.3
Ornithoptera goliath	SPE	US	0	0	0	68	0	6	74	12.3
Ornithoptera goliath	UNS	PG	0	0	0	310	0	0	310	51.7
Ornithoptera goliath procus	BOD	ID	0	0	20	20	0	0	40	6.7
Ornithoptera goliath samson	BOD	ID	0	0	0	435	0	0	435	72.5
Ornithoptera goliath samson	LIV	ID	0	0	0	371	0	0	371	61.8
Ornithoptera goliath supremus	BOD	CA	0	0	0	0	0	4	4	0.7

Note: the unshaded rows in the table indicate records involving known or possible range states.

The export of *O. goliath* from Papua New Guinea is carried out by two organisations, the Insect Farming and Trading Agency (IFTA) and Wau Ecology Institute Insect Ranch (WEIIR). Clark (Manager of IFTA) states that the trade in *O. goliath* consists primarily of dried paired (male and female) butterflies for international collectors, and more recently, as framed specimens for tourists (Clark *in litt.* to TRAFFIC Oceania, 1999b).

Prices vary with the size of specimens. Large dried pairs and specimens with unique aberrations provide the greatest returns with prices for the former reportedly currently lying in the range US\$50-150 in Europe, but the price may drop to US\$30-50 (these are average end market prices) (Hudson *in litt.* to TRAFFIC Oceania, 1999b). In 1999, pairs of *O. g. goliath* from Irian Jaya were advertised by an Australian company on the internet for between AU\$39.95 and AU\$69.95 (approximately US\$25-44) (Anon., 1999).

Live pupae are also exported for zoos and entomological theme parks. Such export apparently requires considerable effort although financial returns are relatively high, as a single specimen may reportedly fetch US\$50-100. Export from Papua New Guinea is apparently hindered by the lack of temperature-controlled transport and the mortality rates of transported live pupae are understood to be high (Hudson *in litt.* to TRAFFIC Oceania, 1999b). Hudson notes that the majority of this market appears to be supplied from Irian Jaya (Hudson *in litt.* to TRAFFIC Oceania, 1999b).

IFTA and WEIIR believe that ranching of this species has been highly successful, but note however, that increased exports of *O. goliath* appear to have quickly flooded the international collectors' market, resulting in a considerable drop in prices. Both organisations believe the key problem with trade in *O. goliath* to be maintaining long-term market viability given the ease in ranching and overproduction (Clark *in litt.* to TRAFFIC Oceania, 1999b; Hudson *in litt.* to TRAFFIC Oceania, 1999b). According to IFTA, a result of lower trade prices is that *O. goliath* will be increasingly sold as cheaper framed specimens for tourists (Hudson *in litt.* to TRAFFIC Oceania, 1999b).

Illegal trade of insects from Papua New Guinea is suspected, involving residents and overseas traders exporting specimens without permits (Clark, *in litt.* to TRAFFIC Oceania, 1999a).

CONSERVATION MEASURES

Indonesia: Wild specimens are reportedly banned from commercial capture and export (Anon. 1993). The species is protected by Decree of Ministry of Agriculture No. 576/Kpts/Um/8/1980, Decree of Ministry of Agriculture No. 716/Kpts/Um/8/1980 and Act No. 5 of 1990 regarding Conservation of Natural Resources and its Ecosystem; followed by Decree of Ministry of Forestry No. 301/Kpts-11/1991 of 10 June 1991, and Decree of Ministry of Forestry No. 882/Kpts-11/1992 of 8 September 1992 (TRAFFIC Southeast Asia *in litt.* to TRAFFIC International, 1999). No export quotas for specimens of this species were issued in the period 1995-1999.

Papua New Guinea: *O. goliath* is listed as Protected under the Fauna (Protection and Control) Act of 1976. Protected species can only be taken for traditional purposes and, consequently, they are

effectively prohibited from commercial use. Section 29 of the Act, however allows the Minister to permit protected species to be taken for "specific purposes". Since 1987, this provision has been used to allow certain protected birdwings to be traded commercially. A later Notice under Section 29 (Taking of Protected Animal for Special Purpose) was gazetted in 1990 which allowed the farming and export of farmed *O. goliath* specimens (Antram, *in litt.* to TRAFFIC Oceania, 1999). The term 'farmed' is not defined but, as other conditions require the release of a percentage of adult specimens to the wild to maintain viable breeding populations, and the setting-aside of natural habitat for conservation of the species, the inference is that the butterflies should be bred in captivity. Two organisations have been granted permission to export these species, IFTA and WEIR (Antram, *in litt.* to TRAFFIC Oceania, 1999). This legislation allows the IFTA and WEIR to self-determine the appropriate percentages of adults released and monitoring. Antram (*in litt.* to TRAFFIC Oceania, 1999) questions the regularity that organisations such as WEIR and IFTA inspect the village ranching communities to ensure the release of a percentage of adult stock.

No export limits have been set by the Papua New Guinea Office of Environment and Conservation for exporters of *O. goliath*. As a CITES-listed species, *O. goliath* is also subject to export control under the International Trade (Fauna and Flora) Act of 1983 (Antram, *in litt.* to TRAFFIC Oceania, 1999).

As noted above, planting of the larval food plant *Aristolochia crassinervia* may reportedly allow rapid local increase of populations of *O. goliath*. However, no quantitative assessment of the effects of such supplementary planting appears to have been carried out.

CAPTIVE-BREEDING

Indonesia: Captive-breeding is said to have been initiated, with five pairs reportedly producing 244 captive-bred adults in Ambon and 484 butterflies ready for export in Irian Jaya (Anon., 1993). Further details are lacking.

Semi-natural butterfly farming by residents around Arfak reserve has been initiated by YBLBC (Muskita, 1995).

Papua New Guinea: IFTA have carried out captive-breeding trials, but found their results produced smaller inferior butterflies (Clark, *in litt.* to TRAFFIC Oceania, 1999b).

The species is currently ranched by the Insect Farming and Trading Agency (IFTA) and the Wau Ecology Institute Insect Ranch (WEIR).

With regard to ranching, exporters obtain specimens by instructing villagers on planting *Aristolochia crassinervia* and how to collect specimens so that they are suitable for trade purposes. Boxes of live pupae are bought from participating villages and then hung on pins on the wall until the imagines emerge. They are transferred to a small cage until their wings are fully extended and dry, and then killed by injection and set (Antram *in litt.* to TRAFFIC Oceania, 1999).

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Ornithoptera rothschildi Kenrick 1911

Rothschild's Birdwing
Ornithoptère de Rothschild

Order: LEPIDOPTERA

Family: PAPILIONIDAE

SUMMARY

A butterfly that has a restricted montane distribution in the Arfak area, north-western Irian Jaya, Indonesia. No overall population data are available but the species is categorised as Vulnerable by IUCN. Some populations have reportedly increased as a result of habitat enrichment associated with a ranching programme. Reported international trade during the period 1991-1996 amounted to about 4,000 individuals, all originating in Indonesia and well over half of them reported in 1996. Over 25% of the trade in 1995 and 1996 was reported by importing countries as wild-caught specimens, whereas all exports reported by Indonesia in these years were declared as captive-bred or ranched. Given the status of the species in the wild it is important that the origin of specimens in trade is clear and unambiguous.

The species is recommended under Decision 10.79 for inclusion in category d (ii).

DISTRIBUTION AND POPULATION

Globally categorised as 'Vulnerable' (IUCN, 1996).

Indonesia: *Ornithoptera rothschildi* is a little-known birdwing with a restricted distribution at high elevations in the mountains of the Arfak area, north-western Irian Jaya, Indonesia.

No overall population data are available. Some populations of *Ornithoptera rothschildi* have reportedly increased in numbers as a result of habitat enrichment as part of a butterfly ranching project around Arfak Nature Reserve (Neville *in litt.* to IUCN/SSC Wildlife Trade Programme, 1999 and see below).

HABITAT AND ECOLOGY

A montane species, occurring in sheltered valleys and ravines that are sunny and protected from strong winds, at altitudes of between 1,800 m and 2,450 m. Virtually nothing is known about its ecology (Collins and Morris, 1985).

THREATS TO SURVIVAL AND DOMESTIC USE

Deforestation was reported as the main threat in the mid-1980s (Collins and Morris, 1985).

Butterfly ranching activities have been developed around Arfak Nature Reserve involving this species and five others (*O. goliath*, *O. priamus*, *O. paradisea*, *O. tithonus* and *Troides oblongomaculatus*). A foundation, Yayasan Bina Lestari Bumi Cendrawasih (YBLBC), was established with the involvement of WWF Indonesia, the Directorate-General of Forest Protection and Nature Conservation (PHPA) and local communities. The programme began in 1987 but ranching activities (chiefly involving habitat enrichment through the planting of food plants, generally in buffer areas around the Arfak Reserve) reportedly did not get under way in earnest until 1993 (Muskita, 1995).

Ornithoptera spp., including *O. rothschildi*, have been observed for sale in Jakarta, where good quality specimens of *Ornithoptera* spp. were offered for IDR 100,000-150,000 (approximately US\$ 11-17) in 1999. It is believed likely that the species is also available in other large Indonesian cities (TRAFFIC Southeast Asia, *in litt.* to TRAFFIC International, 1999).

INTERNATIONAL TRADE

Gross reported trade from 1991-1996 totalled 4,019 'bodies', a further 78 'specimens', also likely to be bodies, and 270 live animals, all of which were reported as originating in Indonesia. Over 25% of the trade in the years 1995 and 1996 has been reported by importing countries as wild-caught specimens, despite commercial export of these being banned by Indonesia. All exports reported by Indonesia in 1995 and 1996 were declared as either captive-bred or ranched (Indonesia did not report the origin of

exports for the years 1992-1994). In all years from 1993 onwards, exports reported by Indonesia (which were on the basis of permits issued and not actual specimens exported) were considerably higher than reported imports from Indonesia so that it is very likely that the same specimens were declared as wild-caught by the importers and captive-bred or ranched by Indonesia.

Gross exports of *Ornithoptera rothschildi*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	Total	Average
BOD	AU	0	0	0	0	0	2	2	0.3	
BOD	CA	0	0	2	58	0	2	62	10.3	
BOD	DE	0	0	0	0	0	2	2	0.3	
BOD	ID	0	0	260	546	470	2649	3925	654.2	
BOD	SG	0	0	2	0	10	0	12	2.0	
BOD	US	0	2	0	2	8	4	16	2.7	
LIV	ID	0	0	0	160	60	50	270	45.0	
SPE	ID	0	0	0	0	0	50	50	8.3	
SPE	US	0	0	0	2	0	26	28	4.7	

In the mid-1980s it was reported that "the very considerable trade in this species has caused comment and concern. High prices were originally quoted when specimens first became available, but by 1982 pairs were selling for £10 or less" (Collins and Morris, 1985). However, no quantitative information on trade volumes during that period is available.

In 1999, pairs of *O. rothschildi* from Irian Jaya were advertised by an Australian company on the internet for prices ranging from AUS\$15.95 (US\$10) to AUS\$24.95 (US\$16) (Anon., 1999).

CONSERVATION MEASURES

Indonesia: The species is protected by Decree of Ministry of Agriculture No. 576/Kpts/Um/8/1980, Decree of Ministry of Agriculture No. 716/Kpts/Um/8/1980 and Act No. 5 of 1990 regarding Conservation of Natural Resources and its Ecosystem; followed by Decree of Ministry of Forestry No. 301/Kpts-11/1991 of 10 June 1991, and Decree of Ministry of Forestry No. 882/Kpts-11/1992 of 8 September 1992. No export quotas for specimens of this species were issued in the period 1995-1999.

There appear to be no quantitative data on the impact of the ranching operations described above on populations of this species.

CAPTIVE-BREEDING

Indonesia: In 1993 it was reported that captive-breeding has been initiated, with 301 'ready for export' butterflies said to have been produced in Irian Jaya (Anon. 1993). Further details are lacking.

Semi-natural butterfly farming by residents around Arfak reserve (including *O. rothschildi*) has been initiated; a co-operative venture involving WWF Indonesia (WWF/IP), Yayasan Bina Lestari Bumi Cendrawasih [an NGO established with WWF/IP assistance] (YBLBC), the Directorate-General of Forest Protection and Nature Conservation (PHPA) and local communities) (D. Neville *in litt.* to IUCN/SSC Trade Programme, 1999; Muskita, 1995).

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Pandinus imperator (Koch 1842)

Emperor Scorpion
Escorpión emperador

Order: SCORPIONES

Family: SCORPIONIDAE

SUMMARY

This African scorpion is poorly known and even the limits of its distribution are unclear. It is, unusually for a scorpion, a social species and has a *K*-selected breeding strategy, making rapid recovery from over-collection unlikely. Reported international trade in the two years since listing in the CITES appendices, amounted to 105,650, and mainly originated in Ghana, Togo and Benin. Since the status of the species in these countries is completely unknown it requires further investigation.

The species is recommended under Decision 10.79 for inclusion in category d (ii).

DISTRIBUTION AND POPULATION

The proposal to include *Pandinus dictator*, *P. gambiensis* and *P. imperator* in Appendix II of CITES (CITES Doc.9.47 Nos.63-65) stated that: 'The distribution of the three species covered by this proposal is uncertain, especially at the borders of their ranges, and the literature on the subjects is confusing.' (Anon, 1994).

The distribution of *P. imperator* was given in the proposal (CITES Doc.9.47 Nos.63-65) as: 'Benin, Chad, Côte d'Ivoire, Senegal, Liberia, Ghana, Guinea, Sierra Leone and Togo. However, as earlier workers considered *P. gambiensis* to be a subspecies of *P. imperator*, the records from Senegal probably refer to that species (Vachon, 1967)'.

'A subspecies, *P. i. subtypicus*, was described from "East Africa" in 1984. Lamoral and Reynders (1975) list specimens identified as *subtypicus* from Eritrea, Sudan and Somalia. However, Karl Kraepelin, who described this subspecies, suggested that *subtypicus*, which reaches only 100 mm. in length, was probably a separate species in his 1899 review of the genus (Kraepelin, 1899). Vachon (1967) considered that *P. imperator* was confined to west Africa (D. Sissom *in litt.* to IUCN Trade Programme, 1999) therefore synonym of another east African species, is probably distinct from *imperator*'.

'Lamoral and Reynders (1975) also list specimens identified as *imperator* from Eritrea, Ethiopia, Gabon, Malagasy Republic, and Nigeria. Except for the last named, these records, all from old museum specimens, probably represent either misidentifications or labelling errors (D. Sissom *in litt.* to IUCN Trade Programme, 1999). The record from Gabon (and possibly from Nigeria as well) may refer to *P. dictator*. No *Pandinus* scorpion is known to occur in the Malagasy Republic.'

'This proposal is therefore written on the assumption that *P. imperator* is confined to the countries listed by Vachon (1967), with the exception of Senegal where it probably does not occur, and Nigeria where it may.'

However, Vachon (1967) actually wrote:

'L'espèce *imperator*, dont malheureusement on ne connaît pas le lieu de capture du type en Afrique de l'Ouest, a une vaste répartition puisqu'on la signale du Sénégal au Tchad et en Libéria, en Guinée, en Sierra Leone, en Côte-d'Ivoire, au Ghana, au Togo, au Dahomey alors qu'une autre espèce: *Pandinus dictator* (POCOCK) la remplace plus à l'Est, au Cameroun.'

This indicates that he had reason to believe that it also occurred in the countries in between Senegal and Chad, i.e. Mali, Burkina Faso and Niger. Although he identified the specimens he examined (number not stated) from Gambia and Senegal as *P. gambiensis* he did not apparently examine the specimens from Senegal referred to by Thorell (1893) in Museo Florence and Werner (1936) in Zoologische Museum, Hamburg, and nowhere suggested that *P. imperator* does not occur in Senegal. He did make reference to Frade (1948) and it is clear that Frade's specimens from Guinea-Bissau should be referred to *P. gambiensis*. He made no reference to Nigeria but this does not warrant the exclusion of this country from the list of range states for the species. The taxon *subtypicus* has never been treated as anything other than a subspecies of *P. imperator* and, since the listing proposal was for

the inclusion of *Pandinus imperator* in Appendix II and did not specifically exclude *P. i. subtypicus*, the latter must be treated as listed.

Based on the taxonomy and list of museum specimens in Lamoral and Reynders (1975), who treated *Scorpio africanus* Linnaeus 1748 (which has no valid taxonomic status), and *Heterometrus roeseli* as synonyms, and *Scorpio africanus subtypicus* as a subspecies, the following are potential range states:

P. i. imperator:

Benin: Listed by Vachon (1967) without further details.

Chad: Listed by Vachon (1967) without further details. Not mapped as occurring by Lourenço and Cloudsley-Thompson (1996).

?Democratic Republic of Congo: *Pandinus imperator*, Upemba National Park (Roewer, 1952). Perhaps a misidentification or labelling error, but no other *Pandinus* species is apparently recorded from this country.

Côte d'Ivoire: Listed by Vachon (1967) without further details. Two ecotypes, corresponding with forest and savanna populations, have been found (Lourenço and Cloudsley-Thompson, 1996).

Equatorial Guinea: *Scorpio roeseli*, Fernando Po [= Bioko] (Pocock, 1888 and 1899). Note that specimens of both this species and *P. dictator* were examined by Pocock (1899) so misidentification of the former is perhaps unlikely.

?Ethiopia: *Scorpio africanus* (Kraepelin, 1894). Perhaps a misidentification or labelling error (Anon., 1994).

?Gabon: *Pandinus imperator (typicus)* (Kraepelin, 1899). Perhaps a misidentification or labelling error (Anon., 1994).

[Gambia: *Scorpio roeseli* (Pocock, 1888). Although listed for Gambia by Pocock (1888) this country is not mentioned in Pocock (1899) and it seems likely the specimens had subsequently been referred to *P. gambiensis*.]

Ghana: *Pandinus imperator*, Ashanti, Axim (Pocock, 1899), *Scorpio africanus* (Kraepelin, 1894), *Scorpio roeseli* (Pocock, 1888).

Guinea: *Heterometrus roeseli*, 'de la côte de Guinée' (Simon, 1872); may refer to *P. gambiensis* since the habitat at this location is similar to that found in Guinea-Bissau, in which case *Heterometrus roeseli* should be treated as a synonym of *P. gambiensis*, rather than of *P. imperator*. *Pandinus imperator*, Mont Nimba, Zouepo (Vachon, 1952).

?Guinea-Bissau: *Pandinus imperator* (Bacelar, 1950). The specimens mentioned by Frade (1948) were referred to *P. gambiensis* by Vachon (1967) and this may well apply to Bacelar's specimens.

Liberia: Listed by Vachon (1967) without further details.

[Madagascar: *Scorpio africanus* (Kraepelin, 1894). No *Pandinus* species is known to occur in the country (Anon., 1994).]

Nigeria: *Pandinus imperator*, Asaba, Ilo [= Illo], Jébbé [= Jebba], Onitsha (Pocock, 1899), Olokemeji (Borelli, 1913), Badagry (Werner, 1936), *Scorpio roeseli*, Onitsha (Pocock, 1888). Nigeria is excluded from the list of range states by Anon. (1994), without good reason. Mapped as occurring by Lourenço and Cloudsley-Thompson (1996).

?Senegal: *Pandinus africanus*, Saint Louis (Thorell, 1893), *Pandinus imperator* (Werner, 1936). May be referable to *P. gambiensis* (Anon., 1994).

Sierra Leone: Listed by Vachon (1967) without further details. Not mapped as occurring by Lourenço and Cloudsley-Thompson (1996).

?Somalia: *Pandinus africanus*, Obbia, Ogaden (Pavesi 1895, 1897). Perhaps a misidentification or labelling error.

?Tanzania: *Scorpio africanus*, Mpwapwa (Kraepelin, 1898). Perhaps a misidentification or labelling error.

Togo: *Pandinus imperator*, Wegbe [= Wogba] (Pocock, 1899), Misahöhe, Sansanne Mangu [= Mango] (Roewer, 1943), Atakpama [= Atakpamé] (Werner, 1902), north (Werner, 1936).

Until the relevant specimens have been re-examined to correct possible misidentifications it is not possible to determine the complete distribution of the species.

P. i. subtypicus:

Eritrea: Habab (Moriggi, 1941).

Somalia: (Caporiacco, 1927), Belâ, Mogadiscio, Obbia, Ogaden (Moriggi, 1941).

Sudan: Djur region (Kraepelin, 1899).

There are few data relating to the populations of this species. Anon. (1994) noted that it 'is becoming increasingly harder to locate and is probably in decline, at least locally.'

In Comoé National Park, Côte d'Ivoire, D. Mahsberg (in IUCN Species Survival Commission and TRAFFIC Network, 1994) recorded between three and five *P. imperator* burrows per 100 m².

HABITAT AND ECOLOGY

D. Mahsberg (*in litt.* to IUCN/SSC Wildlife Trade Programme, 1999) provided details of the life history: age to maturity more than two years, longevity (captive individuals) > 10 years; gestation about one year; mean litter size about 20; iteroparous, breeding interval in the field may be in a two-year cycle; adult males probably solitary; family groups (mother and young) persist for two to three years in subterranean burrows. Sociality in these scorpions seems to have evolved to avoid predation on young. *P. imperator* occurs in a wide variety of habitats in West Africa, but it is more often found in savannahs and gallery forests than in the closed primary forest. These scorpions are typical sit and wait predators and spend most of their lifetime in a burrow (in termite mounds, abandoned burrows of mice or in self-constructed dens) or under a shelter (logged wood etc.). They may be diurnal during the rainy season, and after heavy rains they may leave their burrows and walk around (dispersal, seeking protection against flooding). Finally, he found it to be one of the top arthropod predators in the Comoé National Park and to be adapted to fluctuating prey availability (in this case to peaks in activity of termites *Macrotermes* spp. in the wet season).

THREATS TO SURVIVAL AND DOMESTIC USE

D. Mahsberg (in IUCN Species Survival Commission and TRAFFIC Network, 1994) believed that *P. imperator* is vulnerable to factors such as deforestation and dehydration of tropical habitats, which negatively affect the termite prey species. Because of its social organisation, he also believes the species to be vulnerable to high levels of local collection for trade. If a burrow is found it is easy to dig it out and in many cases whole family groups can be captured. According to M. Braunwalder (in IUCN Species Survival Commission and TRAFFIC Network, 1994), intensive agriculture and inappropriate use of fertiliser and pest control products may also have an impact on these species.

Pandinus species have a *K*-selected breeding strategy, producing small litter sizes (average of 20 young) over long gestation periods (e.g., 370 days) due to their life-history rapid recovery of heavily collected populations is, therefore, unlikely (IUCN Species Survival Commission and Traffic Network, 1994).

INTERNATIONAL TRADE

Since the species was only listed in the CITES appendices on 16 February 1995 the available trade data are restricted to 1995 and 1996. Total gross reported trade in these two years amounted to 105,650. The main exporters were Ghana (61.5%), Togo (25.6%) and Benin (10.2%).

Virtually all *P. imperator* were reported as live wild specimens; a total of 1,600 reported by importing countries as captive-bred in Benin seems unlikely to be correct given that the species is rarely bred (see Captive-breeding). M. E. Braunwalder (*in litt.* to IUCN/SSC Wildlife Trade Programme, 1999) suspected that these specimens are the offspring of wild females which were born in the short transit time between collection and export. The main importers were the United States, the European Union and Japan.

As of March 1999 WCMC had not received Benin's 1995 and 1996 CITES Annual Reports. Consequently imports, exports and re-exports recorded by Benin are were unavailable for the present study.

During 1996 the USA reported the re-export of 89 live specimens of South African origin to Canada (4) and Japan (85). As *P. imperator* does not occur in the wild in South Africa (see Distribution) it seems possible that either the true origin of these specimens was misreported, there was a misidentification of the scorpion species involved, or that these were specimens of *P. imperator*.

previously imported into South Africa from a range state and re-exported to the USA without details available as to their original origin.

It is difficult even for experienced scorpion taxonomists to distinguish between *P. imperator* and *P. dictator*; it is possible only through examination, with a powerful lens or microscope, of the trichobothria (sensory bristles) of dead specimens (IUCN SSC and TRAFFIC Network, 1994. As most of the reported trade is in live specimens, it is possible that there is frequent misidentification of the species involved.

Gross exports of *Pandinus imperator*

TERM	UNIT	CTRY	1995	1996	total	average
BOD		BJ	19	0	19	9.5
BOD		CF	22	0	22	11.0
BOD		TH	0	314	314	157.0
LIV		BE	0	2	2	1.0
LIV		BJ	6429	4347	10776	5388.0
LIV		CA	0	60	60	30.0
LIV		CH	6	0	6	3.0
LIV		DE	76	62	138	69.0
LIV		FR	3	0	3	1.5
LIV		GH	22297	42715	65012	32506.0
LIV		HU	1	0	1	0.5
LIV		TG	16810	10200	27010	13505.0
LIV		US	967	1320	2287	1143.5

The table below gives export figures from Ghana from various sources, which add a number of years to those available from CITES data.

Exports of *Pandinus imperator* from Ghana

Year	Number (Anon. 1994)	Number (Wildlife Dept, Ghana <i>in litt.</i> 1999)	Number (Exports reported by Ghana)	Number (Gross exports from Ghana)
1978	122			
1979	417			
1980	0			
1981	150			
1982	300			
1983	900			
1984	560			
1985	3,400			
1986	911			
1987	4,520			
1988	8,790			
1989	3,775			
1990	8,100			
1991	7,247	9,647		
1992	9,535	14,205		
1993	3,040	7,845		
1994	5,690 (Jan.-May)	13,367		
1995		20,626	20,626	22,297
1996		42,469	41,969	42,715

The retail price advertised on the internet in the USA in 1999 was US\$10 per animal.

CONSERVATION MEASURES

None known.

CAPTIVE BREEDING

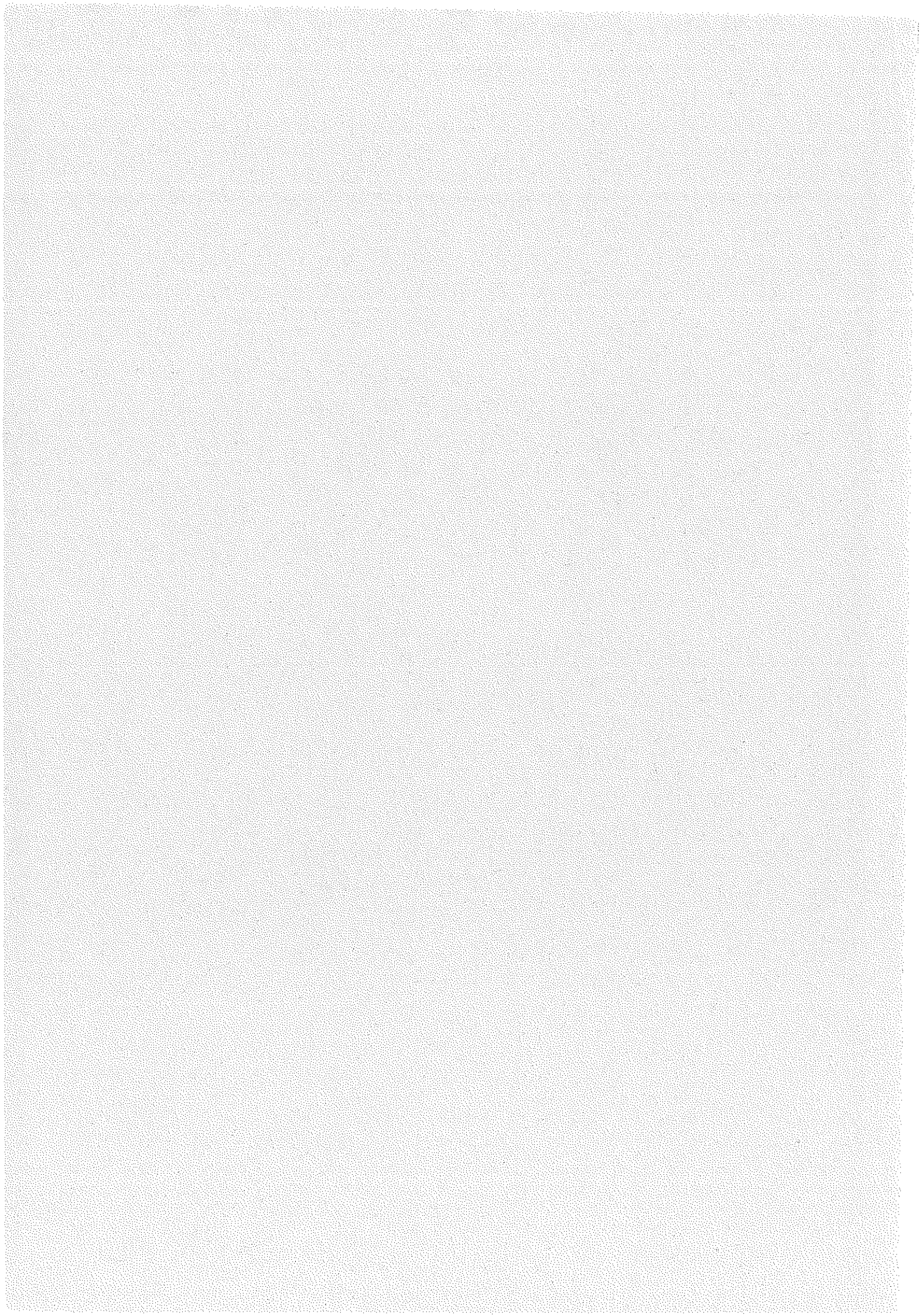
D. Mahsberg (*in litt.* to IUCN/SSC Wildlife Trade Programme, 1999) stated 'there are no breeding operations or intensive management operations on any scorpion species. *Pandinus imperator* may be bred in captivity, but this will take a long time and is of no economic value for the pet trade. *Pandinus* kept under appropriate conditions, may reproduce several times and for several generations, but most of the "breedings" come from the import of pregnant females.'

Lamont (1994) provided details of housing, feeding and breeding *P. imperator*, and Garnier (1974) covered housing and rearing of the species.

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Dendrobates auratus (Girard 1855)

Green-and-black Poison Frog
Dendrobates dore

Order: ANURA

Family: DENDROBATIDAE

SUMMARY

Restricted to the tropical rainforests of southern Central America. Information is lacking on the exact distribution of the species, details of population size or status appear to be unavailable. *D. auratus* has a low fecundity and shows a high level of parental care. The majority of specimens entering international trade originated in Nicaragua and prior to 1996 were declared to be of wild origin; from 1996 most specimens recorded were declared captive-bred. *D. auratus* is reported to be easy to breed in captivity. The paucity of information on population size makes it difficult to assess whether exports from Nicaragua have been detrimental to wild stocks; further details on captive-breeding operations for this species would be useful in assessing their contribution to international trade.

The species is recommended under Decision 10.79 for inclusion in category d) ii.

DISTRIBUTION AND POPULATION

Generally distributed in the tropical forests of southern Central America. Population status information is scarce; *D. auratus* has been generally described as 'common' (Anon., 1987); *Dendrobates* species are considered difficult to census because of their size and tendency to conceal themselves. Further field studies are required to determine the global population status of *D. auratus*.

Colombia: recorded from Chocó (Silverstone, 1975).

Costa Rica: recorded from Alajuela, Cartago, Puntarenas, Limón (Silverstone, 1975).

Nicaragua: recorded from Río San Juan (Silverstone, 1975).

Panama: recorded from Bocas del Toro, Chiriquí, Veraguas, Herrera, Santos, Coclé, Colón, Canal Zone, Panamá, San Blas, Darién (Silverstone, 1975).

[USA]: in 1932, 206 specimens of *D. auratus* from Taboga or Taboguilla Islands, Panama were released in the upper Manoa Valley, Oahu, Hawaii in an attempt to control non-native insects (Silverstone, 1975; McKeown, 1996). A few feral populations of *D. auratus* descended from these animals still persist in the mountains and valleys of Oahu (J. Alvarez, *in litt.* to WCMC, 1999).

There is great geographic variation in the appearance of this species; over 15 distinct colour morphs of wild *D. auratus* have been recorded. (Heselhaus, 1992).

HABITAT AND ECOLOGY

D. auratus inhabits lowland tropical wet or moist forest, to an elevation of 800 m; also found in dense secondary growth and cocoa plantations (Kitasako, 1967; Heselhaus 1992; Silverstone, 1975). Males are essentially non-territorial, but occasionally engage in aggressive competition (Wells, 1978). *D. auratus* is polygynous; females actively compete for males and attempt to guard their mate from others. The species shows a high degree of paternal care. After oviposition upon leaf litter the male guards and cares for the clutch of three to 13 eggs (Silverstone, 1975; Schafer, 1981; Heselhaus, 1992). On hatching (13 to 16 days in captivity) the tadpoles are carried by the male to a stagnant waterbody in a tree-hole, the leaf axil of a bromeliad, or a small ground pool (Eaton, 1941; van Wijngaarden, 1990). Wild tadpoles feed on protozoans and rotifers, and metamorphose after 39 to 89 days; in captivity, sexual maturity is attained at between six and 15 months (Eaton, 1941; Silverstone, 1975; Summers, 1990; Zimmermann and Zimmermann, 1994). A reduction in the number of egg clutches and tadpoles maintained by the male results in a more rapid development of the eggs and higher growth rate of tadpoles (Wells, 1978; Summers, 1990). Longevity of at least six years reported in captivity (Zimmermann and Zimmermann, 1994).

THREATS TO SURVIVAL AND DOMESTIC USE

Habitat loss remains the principal threat to *Dendrobates* species (Zimmermann and Zimmermann, 1994).

Panama: habitat loss is reported to have occurred over large areas; remnant populations are found in narrow strips of riverine vegetation (Heselhaus, 1992). The blue morph of *D. auratus* present on the Pacific side of Panama is believed to be threatened with extinction (Heselhaus, 1992).

[USA]: McKeown (1996) states that populations on Oahu are highly sensitive to destruction of their habitat and overcollection.

Owing to the apparently low fecundity of this species, the possibility exists that overharvesting, especially of the rarer morphs, may contribute to localised population declines. There seems to be no recorded local use of the species.

INTERNATIONAL TRADE

Approximately 18,500 specimens of *D. auratus* were reported in trade over the period 1991 to 1996. The great majority of specimens were live animals, exported from Nicaragua, and presumably destined for the herpetological pet market. Gross exports from Nicaragua rose steadily between 1992 (~410 animals) and 1996 (~7,025) suggesting an increased demand for the species. Between 1991 and 1995 most of the specimens reported in trade were of wild origin, from 1994 the number of captive-bred animals increased, by 1996 the majority of animals reported as exports by range-states were declared captive-bred. Exports of wild *D. auratus* reported by Nicaragua in 1995 and 1996 fell within set export quotas (CITES Notification Nos. 874; 916). All reported exports of *D. auratus* from Panama were for scientific purposes (D.M. Botello *in litt.* to CITES Secretariat, 1999).

The USA was by far the largest single importer of *D. auratus* (~15,000 animals in total); most of these specimens originated in Nicaragua (~90%). Virtually all of the specimens imported into Western Europe between 1992 and 1996 from range states (~1,700 animals) were of Nicaraguan origin (98%). The majority of specimens re-exported by the USA between 1992 and 1996 (~500 animals) were reported to be of Nicaraguan origin.

A single record of illegal trade in *D. auratus* was recorded in CITES annual reports between 1991 and 1996. During 1994 two specimens originating in Panama were reported as seizures by the USA.

Retail dealer prices advertised on the internet in 1998/1999 varied greatly with regards to the provenance and morph of *D. auratus* available. Wild specimens described as 'Costa Rican' were priced in the USA at US\$25-35 per frog, and in the Netherlands at NLG65 (US\$33 per frog); 'Panamanian' specimens were available at US\$40 per frog in the USA and NLG65 (US\$33 per frog) in the Netherlands. Wild specimens from Hawaii were advertised in the USA for US\$35 per frog; it is presumed that these specimens pre-dated the 1998 export ban. Various types of the apparently rarer blue morphs were available in the USA at US\$85-150, and in France at 420FF (US\$72). Specimens of green and black morphs advertised as 'captive bred' were available in the USA at US\$55 per frog; second generation blue morph specimens were advertised in the USA for US\$70.

Gross exports of *Dendrobates auratus*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	Total	Average
BOD	PA		0	0	0	15	0	0	15	2.5
LIV	CR		0	43	30	0	0	20	93	15.5
LIV	CZ		0	0	0	0	0	50	50	8.3
LIV	DE		0	0	192	146	40	135	513	85.5
LIV	DK		0	0	0	0	40	10	50	8.3
LIV	EC		0	0	0	100	0	0	100	16.7
LIV	FR		0	0	92	0	0	0	92	15.3
LIV	GB		0	0	0	364	6	6	376	62.7
LIV	HU		0	107	140	0	10	80	337	56.2

LIV	NI	4	410	1873	2690	3141	7026	1514	2524.0
								4	
LIV	NL	0	6	91	80	209	271	657	109.5
LIV	PA	43	48	8	2	0	24	125	20.8
LIV	PE	0	0	0	0	123	0	123	20.5
LIV	SG	0	0	0	0	0	10	10	1.7
LIV	SK	0	0	12	6	0	0	18	3.0
LIV	US	0	57	72	43	272	211	655	109.2
LIV	XX	0	0	0	0	0	100	100	16.7
SPE	NI	0	0	24	0	0	0	24	4.0

CONSERVATION MEASURES

Colombia: Decree INDERENA No. 39 of 9 July, 1985, forbids the collection of *Dendrobates* spp. from the wild for breeding (or other) purposes. The current validity of this legislation requires confirmation. Export of *D. auratus* is permitted from legally established captive-breeding operations (CITES Notification No. 572).

Nicaragua: an export quota of 2,000 wild *D. auratus* was set for 1995, this was reduced to 1,100 for 1996 and 1997 (CITES Notification Nos. 874; 916; 994) No export quota of wild *D. auratus* was given for 1998 (CITES Notification No. 1998/36).

[USA]: until recently, the government of the State of Hawaii had no restrictions on the export of feral *D. auratus* from Hawaii and CITES export permits were issued for this species by the US Office of Management Authority. However, because of a wide range of problems created by the introduction of exotic amphibian and reptiles species to Hawaii, the Hawaiian Department of Land Resources has recently passed legislation (rule changes to Chapter 13-124 of the Hawaii Administrative rules) making it illegal to possess, or commercially import or export exotic herpetofauna to/from that State. As a result, the US Office of Management Authority is now unable to make the required legal acquisition finding, and therefore, it is no longer issuing CITES export permits for *D. auratus* originating in Hawaii (J. Alvarez, *in litt.* to WCMC, 1999).

CAPTIVE BREEDING

Reported to be easy to keep and breed in the terrarium environment; artificially rearing the tadpoles apparently presents no problems (Heselhaus, 1992).

Nicaragua: the majority of specimens reported as exports in 1996 were declared to be captive-bred (~90%); this requires further investigation.

There is no available information on the viability of captive-bred *D. auratus* stocks. It has been suggested that after a few generations captive populations of *Dendrobates* spp. tend to collapse necessitating the collection of further wild individuals (Anon., 1987). Captive-bred specimens of *Dendrobates* spp. appear to produce few or no skin toxins (Kelley, 1998; Heselhaus, 1992).

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Dendrobates histrionicus Berthold 1845

Harlequin Poison Frog
Rana de punta de flecha histrionica

Order: ANURA

Family: DENDROBATIDAE

SUMMARY

Restricted to the rainforests on the Pacific side of the Andes of northeastern South America. Little information is available on the specific habitat requirements and distribution of the species; there appear to be no population estimates. Known populations of *D. histrionicus* have rapidly declined where rainforest habitat has been disturbed. The tadpoles of this species have a very specialised diet, feeding exclusively on food eggs supplied by the female; successful captive-breeding of *D. histrionicus* by hobbyists is therefore rare, and the species is considered difficult to propagate. The majority of specimens entering international trade are reported to have originated in Ecuador and were declared captive-bred. The captive-breeding operation in Ecuador is reported to have closed in April 1998, and exports to have been prohibited since that time. Recorded international trade from other than Ecuador is at a relatively low level and therefore is unlikely to have a significant impact on wild populations.

The species is recommended under Decision 10.79 for inclusion in category d) iii.

DISTRIBUTION AND POPULATION

Restricted to the Pacific side of the Andes of northeastern South America. *D. histrionicus* has been described as 'relatively common' (Anon., 1987). *Dendrobates* species are considered difficult to census because of their size and tendency to conceal themselves (Anon., 1987). There is little available information on population status.

Colombia: recorded from the Departamentos of Chocó, Antioquia, Risaralda, Valle, Nariño and possibly Cauca (Silverstone, 1975).

Ecuador: recorded from Provincia Esmeraldas and Provincia Pichincha (Silverstone, 1975).

Silverstone (1975) gave the following details of subspecies distribution, although their current validity is unclear:

D. h. histrionicus Berthold: eastern Atrato drainage (Río Arquía) and the upper Río San Juan.

D. h. wittei Laurent: western Atrato drainage, the Baudó drainage, the Alto del Buey, and the middle and lower San Juan drainage.

D. h. sylvaticus Funkhouser: northwestern Ecuador (Provincia Pichincha).

D. h. confluens Funkhouser: extreme southwestern Colombia (Departamento Nariño) and northwestern Ecuador (Provincia Esmeraldas); also at Andagoya, Colombia (Departamento Chocó).

The species exhibits a wide variety of distinct colour morphs (Silverstone, 1975; Zimmermann and Zimmermann, 1994).

HABITAT AND ECOLOGY

A diurnal and mostly terrestrial frog inhabiting lowland tropical rainforests and mountainous rainforests (to 1,000 m) with high levels of precipitation. *D. histrionicus* is usually found on the forest floor, but may also occur in low, bushy, secondary growth; a high abundance of bromeliads typify the habitat (Silverstone, 1975; Zimmermann and Zimmermann, 1994). The diet of *D. histrionicus* consists of ants and small insects foraged from the leaf-litter. Males are territorial and defend small areas; estimates of male home range vary between 4 and 5 m² (Summers, 1992). Silverstone (1975) observed a wild clutch of three eggs laid on a bromeliad at a height of 76 cm above the ground; leaf litter is also commonly used for oviposition. Clutch size in captivity ranges between four and nine eggs; captive females may have five reproductive clutches per year (Heselhaus, 1992; Zimmermann and Zimmermann, 1994). On hatching the female carries the tadpoles to bromeliad leaf axil pools and the

axils of *Heliconia* and *Calathea* plant stems; eggs may be deposited in different axils of the same bromeliad (Summers, 1992; Zimmermann and Zimmermann, 1994). *D. histrionicus* tadpoles are oophagous; the female returns periodically to deposit infertile food eggs for the tadpoles to feed on (Summers, 1992). There appear to be few data on the period required for metamorphosis. Captive froglets are reported to achieve sexual maturity at approximately 10 months (Zimmermann and Zimmermann, 1994). *D. histrionicus* has a captive longevity of 4 years (Zimmermann and Zimmermann, 1994).

THREATS TO SURVIVAL AND DOMESTIC USE

Habitat loss remains the principal threat to *Dendrobates* species (Zimmermann and Zimmermann, 1994).

Ecuador: Zimmermann and Zimmermann, (1994) recorded the rapid decline and extinction of several Ecuadorian populations of *D. histrionicus* following conversion of prime rainforest habitat to monocultures of oil palm, pineapple, or banana. They considered the highly specialised oophagous tadpoles to be especially vulnerable to habitat disturbance.

There seems to be no recorded local use of the species (Silverstone, 1975).

INTERNATIONAL TRADE

The great majority of reported trade over the period 1992 to 1996 was in live animals, presumably for the herpetological pet market. Between 1991 and 1993 there was little reported international trade (<45 animals). A substantial rise in numbers of *D. histrionicus* entering trade from Ecuador occurred from 1994. Nearly all animals reported as exports by range states originated in Ecuador and were declared as captive-bred specimens (approximately 3,800 in annual reports to CITES). All commercial exports of wild fauna from Ecuador are banned (CITES Notification No. 306), however in 1995 and 1996 the USA reported imports of wild animals of Ecuadorian origin (480 and 300 frogs respectively). The only Colombian specimens recorded in trade were 11 live animals of unknown source, and a re-export from Germany of 25 live animals of unknown source, both shipments were reported as imports to the USA.

The USA accounted for approximately 85% of recorded imports from range states in 1994, 100 % in 1995, and around 65% in 1996; much smaller proportions of *D. histrionicus* were exported from Ecuador to Belgium and Germany. Between 1994 and 1995 small numbers of Ecuadorian specimens (1994, 30 animals; 1995, 57 animals) were re-exported from the USA to Canada, Western Europe and Japan. Approximately 325 specimens reported as imports by the USA from Ecuador between 1994 and 1996 were reported as pre-convention origin. There were no illegal imports or exports recorded in CITES annual reports between 1991 and 1996.

During 1998/1999 the average dealer price advertised on the internet for *D. histrionicus* in the USA was US\$40-45 per frog; over the same period the average price in France was 360FF (US\$62) per frog. There were no details as to the provenance of specimens offered.

Gross exports of *Dendrobates histrionicus*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	Total	Average
BOD		EC	0	10	0	0	0	0	10	1.7
BOD		PA	0	10	0	0	0	0	10	1.7
LIV		CO	0	0	0	11	0	0	11	1.8
LIV		DE	0	25	0	0	0	0	25	4.2
LIV		EC	0	0	0	1425	1430	935	3790	631.7
LIV		US	0	0	0	50	57	0	107	17.8

CONSERVATION MEASURES

Zimmermann and Zimmermann (1994) reported on the Tobar Donoso Project in Colombia and Ecuador undertaken by national agencies, conservation institutions, the Awa Indians, and private

individuals to protect 530,000 ha area of pristine rain forest; this area is known to contain populations of *D. histrionicus*.

Colombia: Decree INDERENA No. 39 of 9 July, 1985, forbids the collection of *Dendrobates* spp. from the wild for breeding (or other) purposes. The current validity of this legislation requires confirmation. Export of *D. histrionicus* is permitted from legally established captive-breeding operations (CITES Notification No. 572).

Ecuador: all commercial exports of wild fauna are banned (CITES Notification No. 306).

CAPTIVE BREEDING

Successful captive breeding of *D. histrionicus* by herpetological hobbyists is rare, and the species is considered very difficult to propagate (Heselhaus, 1992).

Ecuador: between 1994 and 1996 virtually all of the specimens reported as exports were declared as captive-bred (10 exported in 1994 were of unknown origin). The only captive-breeding centre for Dendrobatid frogs in Ecuador is reported to have closed in April 1998 (X. Buitron *in litt.* to TRAFFIC International, 1999).

Kelley (1998) states that *Dendrobates* spp. with an oophagous tadpole stage are 'almost exclusively available (to hobbyists) as wild-caught individuals'; the source of these wild individuals is not given. The viability of captive-bred *Dendrobates* stocks is uncertain. It has been suggested that after a few generations captive populations of *Dendrobates* spp. tend to collapse, necessitating the collection of further wild individuals (Anon., 1987). Captive-bred specimens of *Dendrobates* spp. appear to produce few or no skin toxins (Kelley, 1998; Heselhaus, 1992).

REMARKS

The validity of *D. lehmanni* Myers and Daly, has been questioned by Lötters (1992); this taxon may be synonymous with *D. histrionicus*.

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Dendrobates pumilio O. Schmidt 1857

Flaming Poison Frog
Rana de punta de flecha roja
Dendrobates pumilio

Order: ANURA

Family: DENDROBATIDAE

SUMMARY

Generally confined to forests in the southern part of Central America. Little information is available on the specific habitat requirements and distribution of the species; there appear to be no population estimates. The majority of specimens entering trade are reported to have originated in Nicaragua. Prior to 1996 most specimens recorded in international trade were of wild origin; from 1996 over 90% of *D. pumilio* in international trade were declared captive-bred. The tadpoles of this species have a very specialised diet, feeding exclusively on food eggs supplied by the female; captive tadpoles fed on an artificial diet develop very slowly. Given the difficulties in rearing this species, further details on captive-breeding operations for *D. pumilio* in Nicaragua would be useful. Owing to the general lack of information on the species it is difficult to assess the impact of international trade on wild populations.

The species is recommended under Decision 10.79 for inclusion in category d) ii.

DISTRIBUTION AND POPULATION

Generally confined to forests in the southern part of Central America. Population status information for *D. pumilio* is scarce. The species was described by McVey *et al.* (1981) as 'common in the Atlantic lowland tropical forests of Central America'. *Dendrobates* species are considered difficult to census because of their size and tendency to conceal themselves (Anon., 1987).

Costa Rica: recorded from Alajuela, Heredia, San José, Cartago, and Limón (Silverstone, 1975).

Nicaragua: recorded from Matagalpa, Chontales, Zelaya, Río San Juan, and possibly Chinandega (Silverstone, 1975).

Panama: recorded from Bocas del Toro and Veraguas (Silverstone, 1975).

This species exhibits significant colour and pattern polymorphism especially among populations in the Bocas del Toro archipelago of Panama (Summers *et al.*, 1997). Heselhaus (1992) mentions that the many different forms may cause confusion in identifying this species.

HABITAT AND ECOLOGY

A diurnal and mostly terrestrial frog that occurs in lowland tropical moist or wet forest, extending into premontane moist or wet forest to 960 m (Silverstone, 1975). *D. pumilio* occupies restricted areas within a relatively uniform habitat and forages for small insects in leaf litter (Kitasako, 1967). Males appear to be fiercely territorial; individual territories have been estimated at 2.5 m² (Donnelly, 1983). Observations concerning mating behaviour suggest that some *D. pumilio* are at times polygynous (McVey *et al.*, 1981; Donnelly, 1989; Zimmermann and Zimmermann, 1994). Females lay a clutch of three to nine eggs in moist leaf litter; clutch sizes in captive specimens of six to 16 eggs have been recorded (Limerick, 1980; Silverstone, 1975). There appears to be no information on the number of clutches laid annually. *D. pumilio* eggs hatch approximately seven days after oviposition, adults then carry the developed tadpoles from the forest floor to water filled bromeliads (Limerick, 1980). *D. pumilio* tadpoles have a very specialised oophagous diet, feeding solely on food eggs supplied by the female (Heselhaus, 1992; McVey *et al.*, 1981, Zimmermann and Zimmermann, 1994). There is little available information on wild larval development; Heselhaus (1992) reports that captive tadpoles fed an artificial diet 'grow slowly, taking four to six months, a third longer than with natural feeding, to reach metamorphosis'. Sexual maturity is reached at a minimum size of 19 mm (approximately 10 months). There are few data on longevity; Donnelly (1983) concluded that the population at Finca La Selva, Costa Rica was mostly comprised of 'long-lived' adults; Zimmermann and Zimmermann (1994) gave a longevity of 4 years for captive *D. pumilio*.

THREATS TO SURVIVAL AND DOMESTIC USE

Habitat loss remains the principal threat to all *Dendrobates* species (Zimmermann and Zimmermann, 1994). There is little information regarding the exploitation of *D. pumilio*. Illegal trade in the species has recently been recorded (De Witte, 1997), but the extent of this trade is unknown. Because of the apparently low fecundity of this species, the possibility exists that overharvesting may lead to localised population declines. There seems to be no local use of the species (Donnelly, 1983).

INTERNATIONAL TRADE

The great majority of reported trade over the period 1991 to 1996 was in live animals, presumably by the herpetological pet market. The largest overall exporter of *D. pumilio* was Nicaragua (>95% of exports); gross exports from this country rose greatly between 1992 (~350 animals) and 1996 (~7,500 animals). In 1995 slightly more animals (2,029 individuals) than the set quota of 2,000 were reported as exports by Nicaragua (CITES Notification No. 874). There were small quantities of animals exported from Costa Rica (approximately 370 in total); these were largely reported as for scientific purposes. All exports of *D. pumilio* from Panama (165 animals in total) were for scientific purposes.

The USA has consistently accounted for over 80% of recorded live *D. pumilio* imports from Nicaragua; the remaining animals reported were exported from Nicaragua to Japan and Western Europe. Between 1991 and 1996 relatively few animals were reported as exports from Costa Rica and Panama (~535 animals in total). There was little international trade in specimens other than live animals. Between 1993 and 1996 a small number of Nicaraguan specimens (~4% of total USA import) were re-exported from the USA to Canada, Western Europe, Singapore and Japan.

There was no illegal trade in *D. pumilio* recorded in CITES annual reports between 1991 and 1996. Illegal trade in this species has since been reported by De Witte (1997) who described an unsuccessful attempt by two Dutch citizens to illegally export 200 specimens of *D. pumilio* out of Costa Rica.

During 1998/1999 the average dealer price advertised on the internet for *D. pumilio* in the USA was US\$40 per frog; over the same period the average price advertised in the Netherlands was NLG95 (US\$48) per frog.

Gross exports of *Dendrobates pumilio*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	Total	Average
BOD		CR	0	0	7	0	0	0	7	1.2
BOD		US	0	0	0	0	0	2	2	0.3
LIV		CA	0	0	0	12	0	0	12	2.0
LIV		CR	0	55	58	80	80	98	371	61.8
LIV		DE	0	0	0	2	0	0	2	0.3
LIV		HU	0	0	12	0	16	20	48	8.0
LIV		NI	0	346	1774	2452	2704	7537	14813	2468.8
LIV		NL	0	0	15	10	15	20	60	10.0
LIV		PA	38	112	6	0	0	8	164	27.3
LIV		US	0	0	115	62	121	139	437	72.8
LIV		XX	0	0	0	0	0	50	50	8.3
SPE		NI	0	0	32	0	0	0	32	5.3

CONSERVATION MEASURES

Costa Rica: a well-studied population of *D. pumilio* is present in the Finca La Selva Biological Reserve, northeastern Costa Rica (Donnelly, 1983; 1989; 1991; Limerick, 1980; McVey, 1981; Pröhl, 1997); populations are suspected to occur in Braulio Carrillo National Park, Corcovado National Park, and Tortuguero National Park, Costa Rica.

Nicaragua: an export quota of 2,000 wild *D. pumilio* was set for 1995, this was reduced to 1,100 for 1996 and 1997 (CITES Notification Nos. 874; 916; 994) No export quota of wild *D. pumilio* was given for 1998 (CITES Notification No. 1998/36).

Panama: research has been undertaken into the polymorphic population of *D. pumilio* inhabiting the Bocas del Toro archipelago, including those of the Isla Bastimentos National Marine Park (Summers *et al.*, 1997).

CAPTIVE BREEDING

The species is captive bred and raised in terraria by herpetological hobbyists. Outside the terrarium environment the artificial feeding of the highly specialised tadpoles with chicken egg-yolk is reported to be a 'tedious business' (Heselhaus, 1992). According to Kelley (1998) *D. pumilio* in captivity are almost exclusively available as wild-caught individuals. Further research is required to determine the success rate of captive-breeding *D. pumilio*.

Nicaragua: the majority of *D. pumilio* reported as exports in 1996 (~90%) were declared captive-bred; further information on the level of captive-breeding is required.

There is no available material on the viability of captive bred *Dendrobates* stocks. It has been suggested that after a few generations captive populations of *Dendrobates* spp. tend to collapse necessitating the collection of further wild individuals (Anon., 1987). Captive-bred specimens of *Dendrobates* spp. appear to produce few or no skin toxins (Kelley, 1998; Heselhaus, 1992).

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Dendrobates tinctorius (Schneider 1799)

Dyeing Poison Frog
Dendrobate à tapirer

Order: ANURA

Family: DENDROBATIDAE

SUMMARY

Generally distributed in the lowland tropical forests of the Guiana Shield, northern South America. There is little information available on specific distribution or population status, however large areas of apparently suitable habitat, possibly supporting significant populations of *D. tinctorius*, remain. The species occurs in numerous colour morphs; it is possible that targeted collecting of more desirable morphs could lead to localised population declines. Virtually all wild specimens recorded in international trade originated in Suriname; annual exports for *D. tinctorius* from Suriname during 1995 and 1996 were lower than annual export quotas set for this species (1886 specimens). Trade in captive-bred animals developed steadily from 1992 onwards. By 1996 declared captive-bred frogs accounted for approximately 40% of all specimens traded.

The species is recommended under Decision 10.79 for inclusion in category d) iii.

DISTRIBUTION AND POPULATION

Generally distributed in the tropical forests of the three Guianas and adjacent northern Brazil. Not collected south of the Amazon River with any certainty (Silverstone, 1975). Population status information for *D. tinctorius* is scarce. *Dendrobates* species are considered difficult to census because of their size and tendency to conceal themselves (Anon., 1987).

Brazil: Amapá, and possibly Pará (Silverstone, 1975).

French Guiana: present (Silverstone, 1975).

Suriname: Nickerie, Saramacca, and Brokopondo (Silverstone, 1975).

Guyana: Rupununi (Silverstone, 1975).

There is a wide variation in colour and pattern between *D. tinctorius* populations; at least 24 colour morphs have been described (Som, 1999).

HABITAT AND ECOLOGY

A relatively large poison-dart frog which inhabits lowland tropical rainforest to elevations of about 300 m. A diurnal and mostly terrestrial species which is usually encountered amongst leaf-litter in shady areas of forest. Specimens can be found around local villages, and in other disturbed areas (Scales, 1998; Silverstone, 1975). The diet of *D. tinctorius* consists largely of ants and other insects. There is little material available on the reproductive behaviour of *D. tinctorius* in the wild. From information provided in Zimmermann and Zimmermann (1994) it is presumed that the oviposition occurs upon leaf litter and that the male guards and cares for the clutch of eggs. Following hatching it is suspected that the male transfers the tadpoles to a stagnant waterbody. In captivity *D. tinctorius* will breed year-round, except for a rest period which typically occurs in winter (de Vosjoli and McKeown, 1997). Captive clutches consist of between 7 and 9 eggs, and are laid several times per week (Zimmermann and Zimmermann, 1994; de Vosjoli and McKeown, 1997). In captivity tadpoles hatch after 14 to 18 days, with sexual maturity reached at between 18 and 21 months (Heselhaus, 1992; Zimmermann and Zimmerman, 1991). A captive longevity of 11 years has been recorded (Zimmermann and Zimmermann, 1994).

THREATS TO SURVIVAL AND DOMESTIC USE

Habitat loss remains the principal threat to *Dendrobates* species (Zimmermann and Zimmermann, 1994).

French Guiana: Yannick Vasse (1997) reports that the building of a road from Régina to St-Georges of Oyapock has been particularly harmful to the local biotope. This region is well known for its high levels of amphibian populations especially of *D. tinctorius* (which occurs in different morphs).

Populations distributed close to local villages may be susceptible to targeted collecting, as well as human population impacts (J.G. Wilkinson, *in litt.* to IUCN/SSC Trade Programme, 1999).

Silverstone (1975) mentioned various reports on the use of *D. tinctorius* by Amerindians for 'tapirage' - changing the feather colour of living parrots by rubbing defeathered areas with the blood or skin toxin of *D. tinctorius*. The Wai-Wai people of Guyana are reported to rub this frog on the nose of hunting dogs to make them more active, and to increase olfactory sensitivity (Silverstone, 1975).

INTERNATIONAL TRADE

Most specimens of *D. tinctorius* in trade between 1991 and 1996 were live, wild-caught individuals originating in Suriname, presumably for the herpetological pet trade. There were no recorded exports from the other range states. Approximately 5,450 wild-caught animals were recorded in trade between 1991 and 1996.

Prior to 1993 all recorded exports of wild-caught frogs were to the USA (1991, ~350 frogs; 1992, ~700 frogs). Between 1993 and 1996 the numbers of wild *D. tinctorius* imported annually by the USA fluctuated but generally continued to grow from around 260 frogs in 1993 to around 750 frogs in 1996.

From 1993 wild-caught *D. tinctorius* were exported from Suriname to Europe (principally the Netherlands and Switzerland). European imports of wild-caught *D. tinctorius* grew steadily over the period from approximately 365 frogs in 1993 to around 670 in 1996; by 1996 the European market accounted for approximately half the wild-caught animals in international trade. Exports of wild-caught *D. tinctorius* from Suriname to Europe and the USA between 1991 and 1996 increased four-fold. Suriname set an export quota of 1,886 *D. tinctorius* for 1995 and 1996, this was not filled in either year (CITES Notification Nos. 874; 916).

Trade in captive-bred animals developed steadily from 1992 onwards. Increasing numbers of captive-bred *D. tinctorius*, mostly originating in Germany and the Netherlands, were imported into the USA (1992, ~100 frogs; 1996, ~650). By 1996 declared captive-bred frogs accounted for approximately 40% of all specimens traded. There were few re-exports of *D. tinctorius*; the majority of transactions involved small numbers (~50) of declared captive-bred animals between non-range states.

Retail dealer prices published on the internet in 1998/1999 varied greatly with regards to the provenance and morph of *D. tinctorius* available. Prices in the USA ranged between US\$65-175 per frog, and in the Netherlands at NLG110-165 (US\$55-82). Captive-bred frogs were available in both the USA and Netherlands; it was unclear as to whether these specimens were more expensive than wild caught animals.

Illegal trade has occurred. Smuggling of wild *D. tinctorius* to the Netherlands and Germany has been reported (Scales, 1998).

Gross exports of *Dendrobates tinctorius*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	total	average
BOD	NL		0	0	0	0	0	2	2	0.3
LIV	CA		0	0	0	0	26	4	30	5.0
LIV	CH		0	0	0	0	0	80	80	13.3
LIV	DE		0	60	76	238	140	349	863	143.8
LIV	DK		0	0	0	0	0	5	5	0.8
LIV	EC		0	0	0	2	0	0	2	0.3
LIV	HU		0	0	40	0	0	0	40	6.7
LIV	NL		0	50	140	297	355	348	1190	198.3
LIV	SG		0	0	0	0	0	10	10	1.7
LIV	SR		350	709	625	746	1568	1444	5442	907.0

CONSERVATION MEASURES

Brazil: the export of all wildlife has been prohibited since 1967 (Lei 5197, 1967 and Portaria 3481, 1973) (Anon., 1987).

French Guiana: *D. tinctorius* is protected under Article 2 of the Decree of 15 May 1986 (establishing protection measures for reptiles and amphibians that occur in the department of Guyana (French Guiana) throughout the whole national territory or part of it [Official Journal of June 25, 1986]) which states that 'The stuffing or the peddling, the use, the offering for sale, the sale or purchase of dead or live specimens of the reptile and amphibian species mentioned hereunder is prohibited at all time throughout the national territory. Transport of specimens is prohibited at all time throughout the national territory except in the department of Guyana (French Guiana) from which they cannot be however exported' (F. André, *in litt.* to TRAFFIC Europe, 1999).

No *in-situ* management programmes are known (Scales, 1998). Durham University French Guiana Rainforest Amphibian Project (United Kingdom) is planning to continue monitoring amphibian populations, including *D. tinctorius*, in the Saül area (Scales, 1998).

Guyana: export quotas of 100 *D. tinctorius* were set for 1997 and 1998 (CITES Notification Nos. 994; 1998/36).

Suriname: export quotas of 1,886 *D. tinctorius* per year were set from 1995 to 1998 (CITES Notification Nos. 874; 916; 994; 1998/36).

CAPTIVE BREEDING

There were no specimens exported by range states declared as captive-bred. Virtually all of the specimens exported or re-exported by non-range states were reported to be of captive-bred origin.

de Vosjoli and McKeown (1997) state that most *D. tinctorius* sold in the pet-trade are captive-bred; and that several morphs are now available from breeders and dealers on a regular basis. According to Kelley (1998), *D. tinctorius* is commonly available from USA and European breeders, with new morphs introduced each year.

There is no available material on the viability of captive-bred *Dendrobates* stocks. It has been suggested that after a few generations captive populations of *Dendrobates* spp. tend to collapse necessitating the collection of further wild individuals (Anon., 1987). Captive-bred specimens of *Dendrobates* spp. appear to produce few or no skin toxins (Kelley, 1998; Heselhaus, 1992).

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Epipedobates tricolor (Boulenger, 1899)

Phantasmal Poison Frog
Rana de punta de flecha tricolor

Order: ANURA

Family: DENDROBATIDAE

SUMMARY

Restricted to tropical dry forest on the Pacific side of the Andes of northeastern South America. There is very little information on the specific habitat requirements and distribution of the species; there appear to be no population estimates. Habitat loss has been recorded as a threat to *E. tricolor*. The majority of specimens recorded entering international trade between 1991 and 1996 are reported to have originated in Ecuador and were declared captive-bred. The captive-breeding operation in Ecuador is reported to have closed in 1998 and further exports prohibited. *E. tricolor* is reported to be one of the easier poison-arrow frogs to breed in captivity. The recorded international trade in *E. tricolor* appears to be at a low level and is presumed not to currently have a significant impact on wild populations.

The species is recommended under Decision 10.79 for inclusion in category d) iii.

DISTRIBUTION AND POPULATION

Restricted to the Pacific side of the Andes of northeastern South America. Population data are scarce. *Epipedobates* species are difficult to census because of their size and tendency to conceal themselves (Anon., 1987).

Ecuador: southeastern Provincia Bolívar and western Provincia Azuay (Duellman and Wild, 1993).

Peru: Departamento Piura and Departamento Tumbes (Duellman and Wild, 1993).

There is little information available on intraspecific variation. Kelley (1998) mentions that many *E. tricolor* morphs are being bred by hobbyists in the USA.

HABITAT AND ECOLOGY

E. tricolor is a small, diurnal, and terrestrial frog that inhabits tropical dry forest on the Pacific side of the Andes (below 1,700 m); animals are most often encountered near streams and other watercourses. Males are known to be territorial, but home range size is unclear. There are few details on the reproduction of *E. tricolor*. In captivity approximately 30 eggs are deposited by the female in a 'spawning cave'; presumably wild specimens ovideposit on leaf litter. Captive females are prolific and may spawn several times a year (Heselhaus, 1992; Zimmermann and Zimmermann, 1994). After ovideposition the male cares for the egg clutch until hatching (10 to 14 days) upon which the tadpoles are transferred to nearby streams (Heselhaus, 1992; Duellman and Wild, 1993). Sexual maturity is reached at around 9 months; a longevity of 13 years has been recorded in captivity (Zimmermann and Zimmermann, 1994).

THREATS TO SURVIVAL AND DOMESTIC USE

Habitat loss remains the principal threat to *Epipedobates* species (Zimmermann and Zimmermann, 1994).

Ecuador: Duellman and Wild (1993) commented that much of the tropical dry forest of the Cordillera de Huancabamba (where *E. tricolor* has been recorded) has been cleared for agriculture and pasture.

There is no known local use of the species.

INTERNATIONAL TRADE

Reported international trade in *E. tricolor* over the period 1991 to 1996 was entirely of live animals, mostly exported by Ecuador, presumably for the herpetological pet market. From 1991 to 1993

international trade appears to have been restricted to small transactions of captive-bred specimens between non-range states; following 1993 the majority of *E. tricolor* reported in trade (approximately 3,500 animals) were declared as captive-bred specimens, originating in Ecuador, and exported directly to the USA. All commercial exports of wild fauna from Ecuador are banned (CITES Notification No.306), however in 1995 and 1996 the USA reported imports of wild animals of Ecuadorian origin (70 and 120 frogs respectively). There were no exports reported by Peru.

The USA accounted for approximately 85% of recorded imports in 1994, 100% in 1995, and about 75% in 1996; over this period much smaller proportions of *E. tricolor* were exported from Ecuador to Belgium and Germany. From 1993 the trade in captive-bred specimens between non-range states grew steadily. The majority of these (approximately 235 animals) were exported from the Netherlands to the USA. During 1996 there was a single large transaction of 100 declared captive-bred *E. tricolor* from the Czech Republic to Italy. No *E. tricolor* were reported as imports to the Czech Republic during the period 1991 to 1996. The skin toxins produced by *E. tricolor* have been used in medical research for the development of certain pain-killers (Anon., 1998). There were no illegal imports or exports recorded in CITES annual reports.

During 1998/1999 *E. tricolor* was advertised on the internet by dealers in the Netherlands at NGL40-45 (US\$21-23) per frog; over the same period the average price in France was 290FF (US\$50) per frog, and in Canada was advertised at CAD\$45 (US\$30). There were no details as to the provenance of specimens offered.

Gross exports of *Epipedobates tricolor*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	Total	Average
LIV		CZ	0	0	0	0	0	100	100	16.7
LIV		DE	6	30	0	0	0	0	36	6.0
LIV		EC	0	0	0	813	1338	1350	3501	583.5
LIV		HU	0	0	60	0	0	0	60	10.0
LIV		NL	0	13	39	10	105	80	247	41.2
LIV		US	0	0	13	22	30	45	110	18.3
			6	43	112	845	1473	1575	4054	675.7

CONSERVATION MEASURES

Ecuador: all commercial exports of wild fauna are banned (CITES Notification No.306).

No direct conservation measures are known. Further field studies are required to determine the global population status of *E. tricolor*.

CAPTIVE BREEDING

Apparently one of the easier poison arrow frogs to breed in captivity. *E. tricolor* is considered by herpetological hobbyists to be prolific and suitable for beginners (Heselhaus, 1992).

Ecuador: the majority of specimens reported as exports between 1994 and 1996 were declared to be captive-bred. The only captive-breeding centre for Dendrobatid frogs in Ecuador is reported to have closed in April 1998 (X. Buitron *in litt.* to TRAFFIC International, 1999).

Trade in declared captive-bred specimens of *E. tricolor* between non-range states grew steadily after 1991. There is no available material on the viability of captive bred *Epipedobates* stocks. It has been suggested that after a few generations captive populations of *Epipedobates* spp. tend to collapse necessitating the collection of further wild individuals (Anon., 1987). Captive-bred specimens of *Epipedobates tricolor* appear to produce few or no skin toxins (Kelley, 1998; Heselhaus, 1992).

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Hoplobatrachus tigerinus (Daudin, 1802)
(syn. *Rana tigerina*)

Indian Bullfrog
Grenouille tigre

Order: ANURA

Family: RANIDAE

SUMMARY

The global distribution of this frog species is unclear. Available information indicates that *H. tigerinus* is confined to the Indian sub-continent and Sri Lanka; east of Myanmar *H. tigerinus* seems to be replaced by *H. rugulosus* (which is not listed in the CITES Appendices). There is little information available on exact population sizes; in some range states *H. tigerinus* has been described as 'very common'. From 1993 there were no recorded exports of *H. tigerinus* meat from range States, with exports from Bangladesh in 1991-1992 reported to be a clearance of old stock. Exports reported from non-range States, including all recorded post-1992 exports, are suspected to be of *H. rugulosus*. It therefore appears that international trade does not impact negatively on *H. tigerinus*. A further review of the frog leg trade from South and South-East Asia to confirm the species in trade, their status and levels of captive breeding and ranching is warranted.

The species is recommended under Decision 10.79 for inclusion in category d) iii.

DISTRIBUTION AND POPULATION

Widely distributed in the Indian sub-continent (as far east as Myanmar) and Sri Lanka; introduced in Madagascar. There is little information available on the population status of *H. tigerinus*.

Some confusion has arisen over the eastern limits of the species range. *Hoplobatrachus tigerinus* (formerly *Rana tigerina*) has in the past been considered conspecific with *H. rugulosus* (*Rana rugulosa*), which occurs to the east of the range of *H. tigerinus*, in south-east and east Asia. Frost (1985), the taxonomic standard for amphibians adopted by CITES, recognises the two as distinct species but gives the range of *H. tigerinus* as encompassing that of *H. rugulosus*, apparently in error (Zhao and Adler, 1993; van Dijk *in litt.*, 1999). *H. rugulosus* is not listed in the CITES Appendices.

Bangladesh: occurs in all districts, except in immediate coastal areas (Fugler, 1983). Reported to be very common and widespread (Khan, 1982). The greatest population densities occur in the Districts of Mymensingh and Sylhet, and the species is less frequently encountered in the Chittagong Hill Tracts and coastal areas. Fugler (1983) considered that the wild stock was 'seriously stressed by over-exploitation'. An investigation conducted by the Forest Department in 1990 and 1991 estimated the mean density of 33.38 individuals of '*Rana tigerina*' per hectare (Md. Ghulam Habib *in litt.* to TRAFFIC India, 1999).

India: recorded in the states of Tamil Nadu (Murthy, 1977), Orissa (Dutta, 1990), Himachal Pradesh (Dubois, 1980), Maharashtra (Gnanasekar, 1986), Karnataka (Kanamadi *et al.*, 1990) and in the north-east (Chanda, 1990). Total population figures are unknown. Common in the State of Orissa (Dutta, 1990).

[**Madagascar:** introduced (Frost, 1985; Glaw and Vences, 1994) (although it should be confirmed that this population is indeed *Hoplobatrachus tigerinus* rather than *H. rugulosus*.)]

Myanmar: Frogs conforming to *Hoplobatrachus tigerinus* (rather than *H. rugulosus*) have been reported as occurring in upper Myanmar (Smith, 1940 in P.P. van Dijk *in litt.* to IUCN/SSC Wildlife Trade Programme, 1999).

Nepal: found in the west, east and central regions, but not in the north-west (Dubois, 1980).

Pakistan: very common in the northern hilly tracts of Punjab and Azad Kashmir (Khan, 1979). Occurs in the Himalayas in Jammu and Kashmir (Dubois, 1980). An indication of the population density comes from Khan (1979), who reported that the species was found in every water body in Rawalpindi, Manshera, Kotli and Goi, and also in Islamabad.

Sri Lanka: present (Frost, 1985; P.P. van Dijk *in litt* to IUCN/SSC Wildlife Trade Programme, 1999).

[Populations reported from Cambodia, People's Republic of China, People's Republic of, Lao PDR, Western (Peninsular Malaysia, Taiwan, Thailand and Viet Nam recorded by Frost (1985) would appear to be assignable to *H. rugulosus* and not to *H. tigerinus* (Zhao and Adler, 1993; van Dijk *in litt.*, 1999).]

HABITAT AND ECOLOGY

H. tigerinus is mainly aquatic, inhabiting mostly freshwater wetlands, both natural and artificial (especially paddy fields). It is absent or uncommon in forested areas and coastal regions (Fugler, 1983). In Nepal *H. tigerinus* is found in the lower tropical region from 0-500 m; the higher tropical zone 500-1000 m and the subtropical region from 1000-2000 m. It reaches the cooler subtropical altitudes in cultivated valleys such as the Kathmandu Valley (Dubois, 1976). The species is mostly solitary and nocturnal; inhabiting holes and bushes near permanent water courses and pools (Dutta, 1990). Its diet includes invertebrates, small mammals and birds. In India breeding takes place during the monsoon season (Kanamadi *et al.*, 1990), when *H. tigerinus* congregates near ephemeral rainwater pools. There is little available material on reproduction. P.P. van Dijk (*in litt.* to IUCN/SSC Wildlife Trade Programme, 1999) has reported that *H. tigerinus* produces large numbers of eggs (and so has potentially high levels of recruitment), but that there are high mortality rates among tadpoles, froglets and adult frogs.

THREATS TO SURVIVAL AND DOMESTIC USE

Water pollution by pesticides and other agrochemicals is considered to be a potential threat to *H. tigerinus* and other frog species (Gan, 1994; P.P. van Dijk *in litt* to IUCN/SSC Wildlife Trade Programme, 1999).

Bangladesh: domestic demand for frogs as food is very low owing to religious constraints as frogs are not part of the Halal Muslim diet (Masri, 1987; P.P. van Dijk *in litt* to IUCN/SSC Wildlife Trade Programme, 1999)

India: *H. tigerinus* is used as a protein-rich food by several tribal communities in north-eastern India (Roy, 1997).

[China: reference to use of '*R. tigerina*' in China (e.g. Li *et al.*, 1996) is more likely to refer in fact to local populations of *Hoplobatrachus rugulosus* (*Rana rugulosa*).]

[Viet Nam: the domestic demand for frogs as food is reported to be greater than international demand (TRAFFIC Southeast Asia *in litt.* to TRAFFIC International, 1999).]

INTERNATIONAL TRADE

Hoplobatrachus tigerinus are traded internationally for their legs, which are a food product popular in North America and Europe. There is negligible trade in other products. Previously there was some confusion as to the volume of meat in trade. This resulted from trade being reported in a number of different units. Since August 1992, Parties have been requested to report trade in frogs' legs in a standard unit of weight (kg) (CITES Notification No. 668).

Between 1991 and 1996 approximately 2,240,000 kg of meat reported as *H. tigerinus* was recorded in trade in CITES Annual Report data (but see below).

Reported trade peaked in 1992 with just over one million kg of meat recorded in CITES annual report data, virtually all as exports from Bangladesh. Following 1992 exports were stopped from Bangladesh and the quantity of meat reported in trade declined substantially. [The reported export of 2,245 kg of wild source meat of Bulgarian (ISO code BG) origin to the USA from Canada during 1992 is probably erroneous. It is presumed that this meat was of Bangladeshi (ISO code BD) origin. The reported import of 691 kg of live *H. tigerinus* of pre-Convention origin by the USA from Ecuador may also be a misidentification.]

Since 1992, no trade recorded as *Hoplobatrachus tigerinus* has been recorded in CITES annual reports as originating in any country known to have wild populations of this species. However, substantial quantities of frog meat declared as *H. tigerinus* but originating in countries known or suspected to have wild populations of *H.*

rugulosus have been reported in CITES annual reports, notably in 1996 when the USA reported imports of ~140,000 kg of meat from Viet Nam (~15,000 kg of declared captive-bred source) and ~70,500 kg of meat from Hong Kong (reportedly of Vietnamese origin, Hong Kong did not report any imports from Viet Nam).

Recent information on the distribution of *H. tigerinus* suggests that exports from Viet Nam are captive-bred frogs (possibly *H. rugulosa*) mis-identified as *H. tigerinus* (see Distribution and Captive Breeding sections).

Imports to the USA have accounted for over 90% of legal trade for 1991-1996. During this period the Netherlands and Canada also imported notable quantities, much of which appears to have been re-exported to the USA.

During 1993 the USA recorded in its CITES Annual Report the seizure of illegal *H. tigerinus* meat from China (unit not given). The CITES Management Authority of China have no record of this transaction (Fan Zhiyong *in litt.* to WCMC, 1999). In 1993 France reported the seizure of 800 cartons of illegal *H. tigerinus* meat of Vietnamese origin. The Czech Republic reported the seizure of five shipments of illegal meat from Denmark in 1993. In 1994 the USA reported the seizure of 21,247 kg of meat of Vietnamese origin.

Gross exports of *Hoplobatrachus tigerinus*

TER M	UNI T	CTR Y	1991	1992	1993	1994	1995	1996	total	Average
BOD		CN	0	1	1	0	0	0	2	0.3
LIV	KG	EC	0	0	0	0	691	0	691	115.2
LIV	KG	MY	0	0	220	0	0	0	220	36.7
MEA		CN	0	0	1420	0	0	0	1420	236.7
MEA	CAR	VN	0	0	800	0	0	0	800	133.3
MEA	KG	BD	951858	1057832	0	0	0	0	2009690	334948.3
MEA	KG	CA	21628	37370	0	0	0	0	58998	9833.0
MEA	KG	HK	0	0	0	0	0	70547	70547	11757.8
MEA	KG	NL	20356	0	0	0	0	0	20356	3392.7
MEA	KG	TH	0	0	2	0	0	0	2	0.3
MEA	KG	US	0	37269	0	0	0	0	37269	6211.5
MEA	KG	VN	0	0	0	21247	88	139536	160871	26811.8
SPE		IN	0	10	0	0	0	0	10	1.7

Note: the unshaded rows in the table indicate records involving known or previously reported range states.

CONSERVATION MEASURES

Bangladesh: the Bangladesh Wildlife (Preservation) (Amendment) Act 1974, is the only regulation which governs export and import of wildlife in Bangladesh (S.M. Lutfallah *in litt.* to TRAFFIC India, 1999; Md. Ghulam Habib *in litt.* to TRAFFIC India, 1999). '*Rana tigerina*', *Rana hexadactyla* and *Rana limnocharis* are included in Part-1 of the First Schedule of this Act; and so, export of froglegs was permitted as per provisions of the Act. The Government also imposed a ban on capture of wild frogs and processing of froglegs during the breeding season from 15th April to 15th July. CITES export permits were issued for every consignment of froglegs (Md. Ghulam Habib *in litt.* to TRAFFIC India, 1999). The legal export of frogs legs from Bangladesh was banned in 1989 on the advice of a Government Committee. However, during 1991 and 1992 exports were allowed in order to clear old stock (Md. Ghulam Habib *in litt.* to TRAFFIC India, 1999; S.M. Lutfallah *in litt.* to TRAFFIC India, 1999; R. Ahmed *in litt.* to IUCN/SSC Wildlife Trade Programme, 1999). Presently no trade in '*Rana tigerina*' is carried out (Md. Ghulam Habib *in litt.* to TRAFFIC India, 1999).

India: the Government of India has banned the export for commercial purposes of all animal specimens included in CITES Appendix II (as of 4 September 1996) (this includes *H. tigerinus*) (CITES Notification No. 930).

[China: '*Rana tigerina*' (Chinese: Hu Wen Wa) is listed as a Class II protected species in China's Wild Animal

Protection Law (1988). Catching or hunting of wildlife under Class II protection requires a special licence. The sale and purchase of wildlife under special state protection or the products thereof is prohibited. As a CITES Appendix II-listed species, the export and import must be approved by the CITES Management Authority (CITES Management Authority of the People's Republic of China, 1995).

Zhao and Adler (1993) stated that '*R. tigerina*' (now *H. tigerinus*) is not-native to China; they explain that all Chinese populations previously assigned to '*R. tigerina*' are now recognised to be '*R. rugulosa*' (now *H. rugulosus*).]

[Taiwan: *Hoplobatrachus (Rana) tigerinus* is listed as Protected Wildlife (in the category of "rare and valuable species") under the Wildlife Conservation Law (WCL). Captive animals (such as under zoo care) are also regulated by the WCL. According to the WCL, protected species and their products shall not be traded, imported or exported unless under special circumstances recognised in the WCL or related legislation. The WCL also stipulates that no import or export of live wildlife or products of Protected Wildlife are allowed without prior approval from the central government authority. The import or export of live specimens of Protected Wildlife are limited to academic research institutes, colleges or universities, public or licensed private zoos for education or academic research and circus performances (Council of Agriculture, Taiwan, *in litt.* to TRAFFIC East Asia, 1999). [Note that *Hoplobatrachus* populations in Taiwan are almost certainly assignable to *H. rugulosus* (P.P. van Dijk *in litt.* to IUCN/SSC Wildlife Trade Programme, 1999).]

[Viet Nam: the export of *H. tigerinus* under the jurisdiction of the Ministry of Fisheries. The Fisheries Resources Conservation Department issues certificates authorising companies to export frogs and frog legs (TRAFFIC Southeast Asia *in litt.* to TRAFFIC International, 1999). Only captive-bred animals may be exported (Ha Thi Tuyet Nga, *in litt.* to TRAFFIC Southeast Asia, 1999).]

CAPTIVE BREEDING

Bangladesh: there is no captive-breeding (Md. Ghulam Habib *in litt.* to TRAFFIC India, 1999).

Taiwan: there may be some captive breeding facilities for *H. tigerinus* in Taiwan for local consumption (Council of Agriculture, Taiwan, *in litt.* to TRAFFIC East Asia, 1999).

Thailand: Pariyanonth and Daorerk (1995) gave a generalised report on recent farming techniques for the 'local species' '*Rana tigerina*', '*R. rugulosa*' and the non-native *R. catesbeiana*. They described the successful commercial captive-breeding and rearing of these species using induced spawning and commercially pelleted food in both semi-natural and artificial (concrete tanks) systems. They state that these three species are commonly farmed in Thailand.

Viet Nam: there are reported to be thousands of captive breeding farms for '*R. tigerina*', although no exact information is available (Ha Thi Tuyet Nga, *in litt.* to TRAFFIC Southeast Asia, 1999; TRAFFIC Southeast Asia *in litt.* to TRAFFIC International, 1999). During 1996 the USA recorded in its CITES Annual Report the import of ~15,000 kg declared captive-bred *H. tigerinus* meat from Viet Nam.

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Mantella aurantiaca Mocquard, 1900

Golden Mantella
Rana dorada
Mantella dorée

Order: ANURA

Family: RANIDAE

SUMMARY

A small, brightly coloured terrestrial frog found only in the rain-forests of eastern Madagascar above around 900 m altitude, popular with collectors of amphibians particularly in Europe and North America. The only well-known population is small. Overall limits of range and population levels are poorly known although the species is believed threatened by habitat destruction and, possibly, overcollection for export. Classified as "Vulnerable" by IUCN. Listed in CITES Appendix II since 1995. Several thousand a year, all wild-collected, are known to have been exported at least since the early 1990s. Nearly 30,000 are recorded as exported in CITES annual reports for 1995 and 1996, with numbers in 1996 substantially higher than in 1995. No quotas are known to have been set. Captive-breeding has occurred in Europe and North America but numbers reared are believed very low compared with imports from the wild.

The relatively high, evidently uncontrolled and apparently increasing level of exports is a source of concern. In the absence of any population figures it is however impossible to determine whether these exports are sustainable or not.

The species is recommended under Decision 10.79 for inclusion in category d) ii.

DISTRIBUTION AND POPULATION

Endemic to Madagascar.

Madagascar Apparently restricted to eastern central rainforest areas above ca 900 m altitude (Glaw & Vences, 1994). The best known population was reported in 1992 as consisting of some 16 isolated sub-populations each with 20 to 160 calling males in an area (the Marais de Torotorofotsy) some 10 km northwest of Perinet-Andasibe (Zimmermann and Hetz, 1992; Zimmermann and Zimmermann, 1994). It has also been recorded from a number of other sites in the area, one some 60 km away from this population (IUCN Species Survival Commission and TRAFFIC Network, 1994; Glaw and Vences, 1994). The limits of its range are unknown although it is thought that it may occur at scattered localities over a fairly wide area (IUCN Species Survival Commission and TRAFFIC Network, 1994; Glaw *in litt.*, 1999; Jenkins and Rakotomanampison, 1994; Vences *et al.*, in press). A similar orange colour morph has been found in the Ihosy region (central-western Madagascar), although it is not certain that this is *M. aurantiaca* (Glaw and Vences 1994).

Using the figures quoted above, the adult male population of the Marais de Torotorofotsy would in the early 1990s have been somewhere between 320 and 2560. There is no information on sex ratios. The population of the species overall clearly is, or has been, considerably higher than this as evinced by export figures which indicate several thousand wild-collected individuals exported each year since the early 1990s (Jenkins and Rakotomanampison, 1994, and see below).

The species was classified by IUCN in 1996 as Vulnerable (criteria A1cd). There is widespread agreement (as reported in IUCN Species Survival Commission and TRAFFIC Network, 1994) that the species is declining in numbers, although this appears to be inferred from both declining habitat availability and the level of exploitation for the export trade.

Intraspecific variation is discussed under "Notes" below.

HABITAT AND ECOLOGY

M. aurantiaca appears restricted to -- or is most abundant in -- *Pandanus*-swamp areas in rainforest habitats. In the Marais de Torotorofotsy it is found no more than 250 m from water. It feeds on a range of small invertebrates. Breeding in the wild is reported to be seasonal, beginning in December and coinciding with the main part of the wet season which runs overall from November to April (Anon., 1994;

Blommers-Schlösser and Blanc, 1991). Clutches of 20-140 eggs are deposited in moist leaf litter. These hatch after 14 days and the tadpoles are washed into small pools by heavy rain. In captive conditions, tadpoles may metamorphose after a period of from 70 to 150 days. Captive animals reach maturity at around 12-14 months (Glaw and Vences, 1994; Staniszewski, 1998; Zimmerman and Zimmerman, 1994). Longevity in captivity has been recorded at eight years (Staniszewski, 1998).

THREATS TO SURVIVAL AND DOMESTIC USE

Loss of habitat, through deforestation and conversion of *Pandanus*-swamps to paddy fields, and collection for trade were identified in 1994 as important threats (Anon., 1994; IUCN Species Survival Commission and TRAFFIC Network, 1994). The impact of collecting remains unknown.

Local use appears restricted to collection of individuals to show to tourists, who are charged a fee to take photographs. At Andasibe this has led to specimens being translocated from their natural habitat, which is not easily accessible, to easily accessible locations where the species does not naturally occur (Glaw *in litt.*, 1999).

INTERNATIONAL TRADE

Mantella aurantiaca was included in Appendix II of CITES in 1995.

International trade in *M. aurantiaca* appears to be exclusively in live animals for the herpetological pet trade. Virtually all CITES-recorded trade is accounted for by exports from Madagascar, the range state. Recorded exports from other countries are negligible. The USA is by far the largest single importer, accounting for some 60% of recorded imports in 1995 and around 75% in 1996.

Legal exports of *M. aurantiaca* from Madagascar in the early 1990s (pre CITES listing) were believed to be in the region of 3,000-6,000 per year (Jenkins and Rakotomanampison, 1994). Export figures for the two years after the species was listed in CITES Appendix II (1995 and 1996), are much higher (just over 12,000 and just under 17,000 respectively). Either they reflect a genuine increase or they indicate that the previous figures are under-estimates. Given the structure of the Malagasy live animal export trade, discussed in Jenkins and Rakotomanampison (1994), it seems that the change probably reflects a combination of the two.

Wholesale F.O.B (free on board) prices in Madagascar in 1993 were US\$3-5 per frog (Jenkins and Rakotomanampison, 1994). Prices advertised in the USA during the early 1990s were in the region of US\$20-35. In the UK, prices ranged from £25 to £45 (US\$37.50-67.50) (IUCN Species Survival Commission and TRAFFIC Network, 1994). Information from dealers' lists for 1997 and 1999 (TRAFFIC North America *in litt.*, 1999) indicates that retail prices have remained virtually unchanged.

Gross exports of *Mantella aurantiaca*

TERM	UNIT	CTRY	1995	1996	Total	Average
BOD	MG	2	0	2	2	1.0
LIV	DE	0	10	10	10	5.0
LIV	JP	5	0	5	5	2.5
LIV	MG	12110	16767	28877	14438.5	
LIV	SG	0	10	10	10	5.0
LIV	SK	0	52	52	26.0	
LIV	TH	5	0	5	5	2.5
LIV	US	49	118	167	83.5	

It is possible that some of the recorded export represents *Mantella* species other than *M. aurantiaca*; conversely some *M. aurantiaca* may have been exported under different names (see discussion under "Notes" below).

CONSERVATION MEASURES

As of 1994, this species was by default considered a game species in Madagascar (under Décret No. 61-096 of 1961 as amended by Décret No. 88-243 of 1988, which lists fully protected and pest species, and states that all species not so named are game). Collection of such species required a licence issued by the Direction des Eaux et Forêts, along with payment of a fixed tax per specimen collected. The open season for collection is 1 May to the first Sunday of October (Jenkins, 1994).

The species is not known to occur in any protected area.

CAPTIVE BREEDING

The species is known to be bred in captivity in Europe and North America (Bartlett, 1995). Females may lay every two months under ideal conditions (Staniszewski, 1998; Zimmerman and Zimmerman, 1994). It is unclear what proportion of trade is in captive-bred specimens, although indications are that it is not high. Glaw (*in litt.*, 1999) notes that captive-breeding of *Mantella* spp. in large numbers requires a great deal of effort. There is no evidence of captive breeding in Madagascar (Glaw *in litt.*, 1999; Jenkins and Rakotomanampison, 1994).

REMARKS

Taxonomy of *Mantella* species including *M. aurantiaca* is very confused at present. Many different varieties and intermediate forms between *M. aurantiaca*, *M. crocea*, and *M. milotympanum* are reportedly present in trade (Glaw *in litt.*, 1999). Allozyme and osteological studies apparently indicate that these three species are virtually identical from genetic and osteological viewpoints, indicating that they may be only colour morphs of one species (Glaw *in litt.*, 1999; Vences *et al.*, 1998a & b). However, there are reportedly chromosomal differences which may support their retention as separate species (Glaw *in litt.*, 1999; Pintak *et al.*, 1998; Vences *et al.*, in press).

In captivity, *M. aurantiaca* can hybridize with very differently coloured species such as *M. madagascariensis*. Hybrid offspring are similar in appearance to some apparently wild-collected morphs that have appeared in trade (Glaw, *in litt.*, 1999).

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***Ornithoptera chimaera* (Rothschild 1904)**

Chimaera birdwing
Ornithoptère chimère

Order: LEPIDOPTERA

Family: PAPILIONIDAE

SUMMARY

A butterfly that is widely distributed in montane areas of Papua New Guinea and Irian Jaya, Indonesia. Its populations are related to the availability of the food plant *Aristolochia momandul*. In Papua New Guinea, as part of a ranching programme, the food plant has been widely propagated, and in localised areas where this has taken place there has apparently been a rapid increase in the numbers of this butterfly. Numbers reported in international trade rose rapidly during the period 1991-1996, all originating in Papua New Guinea. It is assumed that this is related to the success of the ranching operations and, although the ecological impact of this programme remains to be assessed, there is no evidence that international trade is adversely affecting populations of the species.

The species is recommended under Decision 10.79 for inclusion in category d (iii)

DISTRIBUTION AND POPULATION

Widely distributed through, yet ecologically restricted to, montane areas of Papua New Guinea and Irian Jaya. The species is likely to occur in any areas with fairly extensive mild montane forests above 1,500 m altitude (Hudson *in litt.* to TRAFFIC Oceania, 1999b).

Indonesia: *O. c. charybdis* is known from Irian Jaya, from the Wandammen Mountains on the east coast of the Vogelkop (Berau Peninsula) through the Weyland Mountains to an outlying locality in the Pergunungan Maoke (Snow Mountains). There is an outlying record of *O. c. chimaera*. (Collins and Morris, 1985).

Papua New Guinea: *O. c. chimaera* is widely distributed along the central cordillera and has been recorded from the Finisterre Mountains and those of the Huon Peninsula. Parsons (1991) considered that it was rare in the Bulolo-Wau valley.

No overall population estimates are available. The species believed to be restricted to one species of food-plant, *Aristolochia momandul*, and the density of larvae is low (Collins and Morris, 1985). Populations can reportedly quickly increase locally in response to planting of *Aristolochia momandul* in conjunction with ranching programmes (see 'Captive Breeding' below) (Hudson *in litt.* to TRAFFIC Oceania, 1999a).

Neither organisation currently ranching this species (the Insect Farming and Trading Agency IFTA and the Wau Ecology Institute Insect Ranch WEIIR, both in Papua New Guinea) has the resources to undertake general population monitoring or reportedly has plans to do so (Clark, *in litt.* to TRAFFIC Oceania, 1999a; Hudson, *in litt.* to TRAFFIC Oceania, 1999b). Both have stressed that in view of the extent of the species range and the often steep terrain such an undertaking would be unrealistic.

HABITAT AND ECOLOGY

Occurs in areas of tall but fairly open primary forest, often in moderately to very steep sided valleys along water courses at altitudes of between 1,200 m and 1,800 m (mainly between 1,600 m and 1,800 m) but has also been observed in altitudes ranging up to 2800 m (Hudson *in litt.* to TRAFFIC Oceania, 1999b). As far as is known, larvae only feed on one species of climbing plant, *Aristolochia momandul*, and population numbers directly reflect the availability of this species. *A. momandul* is very slow growing and prefers well-drained areas at higher altitudes (Hudson, *in litt.* to TRAFFIC Oceania, 1999a).

Like many birdwings, *O. chimaera* is a K-selected species, producing few, well-protected offspring compared with many other butterflies. Females may produce 6-10 eggs and range widely, apparently often in search of oviposition sites. The egg stage lasts 14 days, the larval stage probably about two months and the pupal stage for about 49-70 days (Collins and Morris, 1985).

THREATS TO SURVIVAL AND DOMESTIC USE

Collins and Morris (1985) expressed concern at the impact of fire (e.g. in the Wandamenn Mountains in Irian Jaya) and of increased logging (e.g. in the Weyland Mountains in Papua New Guinea) on the habitat of the species. However, Hudson (*in litt.* to TRAFFIC Oceania, 1999b) has noted that the steep topography of this species range makes the habitat, in general, difficult to exploit commercially.

Clark (*in litt.* to TRAFFIC Oceania, 1999b) notes that recent drought caused by El Niño climatic conditions appears to have had considerable impact on butterfly populations. However, he believes that villagers in some parts of Papua New Guinea have buffered populations of *O. chimaera* from decline as they have a financial interest in tending and watering the *A. momandul* food plants (see below).

Indonesia: *Ornithoptera* spp., including *O. chimaera*, have been observed for sale in Jakarta, where good quality specimens of *Ornithoptera* spp. were offered for IDR 100,000-150,000 (approximately US\$ 11-17) in 1999. It is believed likely that the species is also available in other large Indonesian cities (TRAFFIC Southeast Asia, *in litt.* to TRAFFIC International, 1999).

Papua New Guinea: There does not appear to be any significant domestic use of *O. chimaera* (Antram, *in litt.* to TRAFFIC Oceania, 1999). However, the species is ranched for export. IFTA and WEIIR obtain specimens by instructing villagers on how to plant *A. momandul* and how to collect specimens so that they are suitable for trade purposes. Boxes of live pupae are bought from participating villages and then hung on pins on the wall until the imagines emerge. They are transferred to a small cage until their wings are fully extended and dry, and then killed by injection and set (Antram, *in litt.* to TRAFFIC Oceania, 1999).

There is no known documented assessment of the ecological impact of ranching activities (Antram, *in litt.* to TRAFFIC Oceania, 1999). With regard to the sustainability of harvests, Hudson, of the Wau Ecology Institute Insect Ranch, (*in litt.* to TRAFFIC Oceania, 1999a) comments that not all pupae are harvested as many are located high in the canopy and are therefore inaccessible to villagers. In general, the Insect Ranch accumulates around 100-200 pairs of a given butterfly species from villagers and then stops buying that species until the stock has been sold. The break may be up to six months long, theoretically allowing populations time to recover. Hudson also notes that some farmers providing specimens to the WEIIR reportedly plant more than 1,000 *Aristolochia* plants, with the result that *Ornithoptera* populations may apparently increase dramatically in a short period of time once sufficient numbers of *Aristolochia* have become established (Hudson *in litt.* to TRAFFIC Oceania, 1999a).

The Manager of the Insect Farming and Trading Agency (IFTA) in Papua New Guinea has observed that the flooded export market has reduced prices, providing a form of harvest control (Clark *in litt.* to TRAFFIC Oceania, 1999b).

INTERNATIONAL TRADE

Gross trade reported from 1991-1996 amounted to 1,488 individuals, virtually all of which were reported as originating in Papua New Guinea. The numbers exported from Papua New Guinea increased from only 29 in 1991 to 1,074 in 1996. Only one export was reported as originating in Indonesia – imported to the USA from Canada in 1996. The source of animals in trade was generally unrecorded, although there are several records of captive-bred specimens in trade originating in Papua New Guinea. It seems probable that these are ranched specimens that have been misreported (see Captive-Breeding).

Gross exports of *Ornithoptera chimaera*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	Total	Average
BOD		AU	0	0	0	1	1	0	2	0.3
BOD		CA	0	0	0	0	5	8	13	2.2
BOD		DE	8	0	0	0	2	2	12	2.0
BOD		PG	19	53	38	40	209	1074	1433	238.8
BOD		SG	0	0	1	0	0	0	1	0.2
LIV		DE	10	0	0	0	2	0	12	2.0

LIV	PG	10	1	0	0	0	0	11	1.8
SPE	PG	0	0	0	0	0	4	4	0.7
SPE	US	0	0	0	0	0	2	2	0.3
UNS	PG	0	0	0	4	0	0	4	0.7

The export of *O. chimaera* from Papua New Guinea is carried out by two organisations, the Insect Farming and Trading Agency (IFTA) and Wau Ecology Institute Insect Ranch (WEIIR). Clark (Manager of IFTA) states that the trade in *O. chimaera* consists primarily of dried paired (male and female) butterflies for international collectors, and more recently, as framed specimens for tourists (Clark *in litt.* to TRAFFIC Oceania, 1999b).

Prices vary with the size of specimens. Large dried pairs and specimens with unique aberrations provide the greatest returns with prices for the former reportedly currently lying in the range US\$150-200 in Europe. Specimens reared in Papua New Guinea are reportedly larger than specimens derived from Irian Jaya (Hudson *in litt.* to TRAFFIC Oceania, 1999b).

Live pupae are also exported for zoos and entomological theme parks. Such export apparently requires considerable effort although financial returns are relatively high, as a single specimen may reportedly fetch US\$50-100. Export from Papua New Guinea is apparently hindered by the lack of temperature-controlled transport and the mortality rates of transported live pupae are understood to be high (Hudson *in litt.* to TRAFFIC Oceania, 1999b). Hudson notes that the majority of this market appears to be supplied from Irian Jaya (Hudson *in litt.* to TRAFFIC Oceania, 1999b), although CITES Annual Report data do not show the export any *O. chimaera* from Indonesia.

IFTA and WEIIR believe that ranching of this species has been highly successful, noting however, that increased exports of *O. chimaera* appear to have quickly flooded the international collectors' market, resulting in a considerable drop in prices. Both organisations believe the key problem with trade in *O. chimaera* to be maintaining long-term market viability given the ease in ranching and overproduction (Clark *in litt.* to TRAFFIC Oceania, 1999b; Hudson *in litt.* to TRAFFIC Oceania, 1999b).

Illegal trade of insects from Papua New Guinea is suspected, involving residents and overseas traders exporting specimens without permits (Clark, *in litt.*, to TRAFFIC Oceania, 1999a).

CONSERVATION MEASURES

Indonesia: Wild specimens are reportedly banned from commercial capture and export (Anon., 1993). The species is protected by Decree of Ministry of Agriculture No. 576/Kpts/Um/8/1980, Decree of Ministry of Agriculture No. 716/Kpts/Um/8/1980 and Act No. 5 of 1990 regarding Conservation of Natural Resources and its Ecosystem; followed by Decree of Ministry of Forestry No. 301/Kpts-11/1991 of 10 June 1991, and Decree of Ministry of Forestry No. 882/Kpts-11/1992 of 8 September 1992 (TRAFFIC Southeast Asia *in litt.* to TRAFFIC International, 1999). No export quotas for specimens of this species were issued in the period 1995-1999.

Papua New Guinea: Listed as Protected under the Fauna (Protection and Control) Act of 1976. Protected species can only be taken for traditional purposes and, consequently, they are effectively prohibited from commercial use. However, Section 29 of the Act allows the Minister to permit protected species to be taken for "specific purposes". Since 1987, this provision has been used to allow certain protected birdwings to be traded commercially. A later Notice under Section 29 (Taking of Protected Animal for Special Purpose) was gazetted in 1990 which allowed the farming and export of farmed *O. chimaera* specimens (Antram, *in litt.* to TRAFFIC Oceania, 1999). The term 'farmed' is not defined but, as other conditions require the release of a percentage of adult specimens to the wild to maintain viable breeding populations, and the setting-aside of natural habitat for conservation of the species, the inference is that the butterflies should be bred in captivity. Two organisations have been granted permission to export these species, IFTA and WEIIR (Antram, *in litt.* to TRAFFIC Oceania, 1999). This legislation allows the IFTA and WEIIR to self-determine the appropriate percentages of adults released and monitoring. Antram (*in litt.* to TRAFFIC Oceania, 1999) questions the regularity that organisations such as WEIIR and IFTA inspect the village ranching communities to ensure the release of a percentage of adult stock.

No export limits have been set by the Papua New Guinea Office of Environment and Conservation for exporters of *O. chimaera*. As a CITES-listed species, export is subject to control under the International Trade (Fauna and Flora) Act of 1983 (Antram, *in litt.* to TRAFFIC Oceania, 1999).

As noted above, planting of the larval food plant *Aristolochia momandul* may reportedly allow rapid local increase of populations of *O. chimaera*. However, no quantitative assessment of the effects of such supplementary planting appears to have been carried out.

New and Collins (1991) recommended that reserves should be established at Telefomin, Bundi, Naniwe Mission, Tapini-Woitape and Central Huon.

CAPTIVE-BREEDING

Indonesia: No information.

Papua New Guinea: *O. chimaera* is not currently known to be captive-bred in Papua New Guinea. IFTA has reportedly carried out captive-breeding trials, but found the results produced smaller inferior butterflies (Clark *in litt.* to TRAFFIC Oceania, 1999b). The species is currently ranched by the Insect Farming and Trading Agency (IFTA) and the Wau Ecology Institute Insect Ranch (WEIIR).

With regard to ranching, exporters obtain specimens by instructing villagers on planting *Aristolochia momandul* and collecting specimens that are suitable for trade purposes. Boxes of live pupae are bought from participating villages and then hung on pins on the wall until the imagines emerge. They are transferred to a small cage until their wings are fully extended and dry, and then killed by injection and set (Antram *in litt.* to TRAFFIC Oceania, 1999).

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Ornithoptera goliath Oberthür 1888

Goliath Birdwing
Ornithoptera goliath

Order: LEPIDOPTERA

Family: PAPILIONIDAE

SUMMARY

A butterfly that occurs in Indonesia (Seram, Waigeo, Irian Jaya) and Papua New Guinea. It is widely distributed in New Guinea and population numbers are related to the availability of its food plant, *Aristolochia crassinervia*. Populations reportedly increase rapidly in response to planting the food plant. Reported international trade during the period 1991-1996 amounted to 13,181 dead specimens and 2,674 live specimens, with roughly equal numbers originating in Indonesia and Papua New Guinea. Numbers in trade increased rapidly during the period to a peak in 1996, presumably as a result of the success of the ranching operations. There is no evidence that international trade is adversely affecting wild populations of the species.

The species is recommended under Decision 10.79 for inclusion in category d (iii).

DISTRIBUTION AND POPULATION

Occurs in Indonesia and Papua New Guinea. Evidently widespread on New Guinea and some associated islands.

Indonesia: Recorded from Seram, Waigeo and Irian Jaya. In the latter generally distributed along the northern side of the central mountain ranges (Collins and Morris, 1985; D'Abrera, 1975).

No overall population figures are available. However, it was noted that the species started to appear in abundance once its food plant was planted in semi-natural butterfly farming by residents around Arfak reserve (a co-operative venture involving WWF Indonesia (WWF/IP), Yayasan Bina Lestari Bumi Cendrawasih [an NGO established with WWF/IP assistance] (YBLBC), the Directorate-General of Forest Protection and Nature Conservation (PHPA) and local communities) (D. Neville *in litt.* to IUCN/SSC Trade Programme, 1999; Muskita, 1995).

Papua New Guinea: Generally distributed on the northern side of the central mountain ranges of the island of New Guinea, but at the Huon Peninsula it also crosses the ranges near the Markham River and intrudes deep into the foothills of the Bowutu Mountains, and possibly further south; also recorded from Goodenough Island (Collins and Morris, 1985; D'Abrera, 1975). Noted by Clark (*in litt.* to TRAFFIC Oceania, 1999a) as widespread but generally scarce. Their population numbers directly reflect the availability of their specific larvae food plant *Aristolochia crassinervia* and populations can reportedly rapidly increase in response to planting of this species (Hudson, *in litt.* to TRAFFIC Oceania, 1999a).

Neither organisation currently ranching this species (the Insect Farming and Trading Agency IFTA and the Wau Ecology Institute Insect Ranch WEIIR, both in Papua New Guinea) has the resources to undertake general population monitoring or reportedly has plans to do so (Clark, *in litt.* to TRAFFIC Oceania, 1999a; Hudson, *in litt.* to TRAFFIC Oceania, 1999b)). Both have stressed that in view of the extent of the species range and the often steep terrain, such an undertaking would be unrealistic.

D'Abrera (1975) recognised two subspecies: *O. g. procius* from Seram and the nominate form from the remainder of the range.

HABITAT AND ECOLOGY

Prefers good secondary forest or primary forest along watercourses where *A. crassinervia* grows (Hudson *in litt.* to TRAFFIC Oceania, 1999a). *A. crassinervia* takes approximately 18 months to 2 years to grow to a size that is capable of enduring infestation by *O. goliath* larvae. The ecological specialisation for *A. crassinervia* makes the species attractive for butterfly ranching (TRAFFIC Oceania *in litt.* to TRAFFIC International, 1999).

THREATS TO SURVIVAL AND DOMESTIC USE

There does not appear to be any significant domestic use of *O. goliath* in Papua New Guinea (Antram, *in litt.* to TRAFFIC Oceania, 1999).

Ornithoptera spp., including *O. goliath*, have been observed for sale in Jakarta, where good quality specimens of *Ornithoptera* spp. were offered for IDR 100,000-150,000 (approximately US\$ 11-17) in 1999. It is believed likely that the species is also available in other large Indonesian cities (TRAFFIC Southeast Asia, *in litt.* to TRAFFIC International, 1999). The *Surabaya Post* of 30 January 1996 reported on the illegal catching of butterflies using expired illegally obtained permits from the Indonesian Department of Forestry. The accused sold mounted specimens of *O. goliath* in 1996 to a businessman from Jakarta for IDR 75,000 (approximately US\$ 8) per specimen (TRAFFIC Southeast Asia, *in litt.* to TRAFFIC International, 1999).

There is no known documented assessment of the ecological impact of ranching activities (Antram, *in litt.* to TRAFFIC Oceania, 1999). With regard to the sustainability of harvests, Hudson of the Wau Ecology Institute Insect Ranch, (*in litt.* to TRAFFIC Oceania, 1999a) comments that not all pupae are harvested as many are located high in the canopy and are therefore inaccessible to villagers. In general, the Insect Ranch accumulates around 100-200 pairs of a given butterfly species from villagers and then stops buying that species until the stock has been sold. The break may be up to six months long, theoretically allowing populations time to recover (Hudson *in litt.* to TRAFFIC Oceania, 1999a). Hudson also notes that some farmers providing specimens to the WEIR reportedly plant more than 1,000 *Aristolochia* plants, with the result that *Ornithoptera* populations may apparently increase dramatically in a short period of time once sufficient numbers of *Aristolochia* have become established (Hudson *in litt.* to TRAFFIC Oceania, 1999a).

The Manager of the Insect Farming and Trading Agency (IFTA) in Papua New Guinea has observed that the flooded export market has reduced prices, providing a form of harvest control (Clark *in litt.* to TRAFFIC Oceania, 1999b).

Clark noted (*in litt.* to TRAFFIC Oceania, 1999b) that the recent drought caused by El Nino climatic conditions have had considerable impact on butterfly populations. However, he believes that villagers have buffered populations of *O. goliath* from decline in certain areas as they have a financial interest in tending and watering the *A. crassinervia* food plants.

INTERNATIONAL TRADE

Gross international trade reported to CITES from 1991-1996 totalled 13,181 whole dead specimens and 2,764 live specimens. Trade increased rapidly during the period, with very few exports reported in 1991 and over 5,500 in 1996. The two range States were equally involved in exporting the species: Indonesia (46%) and Papua New Guinea (51%). The main importing countries were Japan and Germany.

Gross exports of *Ornithoptera goliath*

TAXON	TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	Total	average
Ornithoptera goliath	BOD	AU	0	0	0	0	0	0	26	26	4.3
Ornithoptera goliath	BOD	CA	0	0	2	12	141	45	200	33.3	
Ornithoptera goliath	BOD	CH	0	0	0	0	0	2	2	0.3	
Ornithoptera goliath	BOD	DE	1	0	30	9	16	60	116	19.3	
Ornithoptera goliath	BOD	DK	0	0	30	0	0	0	30	5.0	
Ornithoptera goliath	BOD	FR	0	0	0	0	2	0	2	0.3	
Ornithoptera goliath	BOD	GB	0	0	0	20	40	0	60	10.0	
Ornithoptera goliath	BOD	ID	0	14	292	991	2018	2647	5962	993.7	
Ornithoptera goliath	BOD	PG	8	465	1112	1155	2088	1261	6089	1014.8	
Ornithoptera goliath	BOD	SG	0	0	16	131	4	0	151	25.2	
Ornithoptera goliath	BOD	US	14	0	28	3	18	1	64	10.7	
Ornithoptera goliath	LIV	DE	0	0	0	0	16	0	16	2.7	
Ornithoptera goliath	LIV	GB	0	0	0	0	30	0	30	5.0	
Ornithoptera goliath	LIV	ID	0	160	0	100	100	0	360	60.0	

Ornithoptera goliath	LIV	PG	0	2	0	16	514	1455	1987	331.2
Ornithoptera goliath	SPE	CA	0	0	0	0	0	10	10	1.7
Ornithoptera goliath	SPE	DE	0	0	0	0	0	2	2	0.3
Ornithoptera goliath	SPE	ID	0	0	0	0	0	91	91	15.2
Ornithoptera goliath	SPE	PG	0	0	0	0	0	8	8	1.3
Ornithoptera goliath	SPE	US	0	0	0	68	0	6	74	12.3
Ornithoptera goliath	UNS	PG	0	0	0	310	0	0	310	51.7
Ornithoptera goliath procus	BOD	ID	0	0	20	20	0	0	40	6.7
Ornithoptera goliath samson	BOD	ID	0	0	0	435	0	0	435	72.5
Ornithoptera goliath samson	LIV	ID	0	0	0	371	0	0	371	61.8
Ornithoptera goliath supremus	BOD	CA	0	0	0	0	0	4	4	0.7

Note: the unshaded rows in the table indicate records involving known or possible range states.

The export of *O. goliath* from Papua New Guinea is carried out by two organisations, the Insect Farming and Trading Agency (IFTA) and Wau Ecology Institute Insect Ranch (WEIR). Clark (Manager of IFTA) states that the trade in *O. goliath* consists primarily of dried paired (male and female) butterflies for international collectors, and more recently, as framed specimens for tourists (Clark *in litt.* to TRAFFIC Oceania, 1999b).

Prices vary with the size of specimens. Large dried pairs and specimens with unique aberrations provide the greatest returns with prices for the former reportedly currently lying in the range US\$50-150 in Europe, but the price may drop to US\$30-50 (these are average end market prices) (Hudson *in litt.* to TRAFFIC Oceania, 1999b). In 1999, pairs of *O. g. goliath* from Irian Jaya were advertised by an Australian company on the internet for between AU\$39.95 and AU\$69.95 (approximately US\$25-44) (Anon., 1999).

Live pupae are also exported for zoos and entomological theme parks. Such export apparently requires considerable effort although financial returns are relatively high, as a single specimen may reportedly fetch US\$50-100. Export from Papua New Guinea is apparently hindered by the lack of temperature-controlled transport and the mortality rates of transported live pupae are understood to be high (Hudson *in litt.* to TRAFFIC Oceania, 1999b). Hudson notes that the majority of this market appears to be supplied from Irian Jaya (Hudson *in litt.* to TRAFFIC Oceania, 1999b).

IFTA and WEIR believe that ranching of this species has been highly successful, but note however, that increased exports of *O. goliath* appear to have quickly flooded the international collectors' market, resulting in a considerable drop in prices. Both organisations believe the key problem with trade in *O. goliath* to be maintaining long-term market viability given the ease in ranching and overproduction (Clark *in litt.* to TRAFFIC Oceania, 1999b; Hudson *in litt.* to TRAFFIC Oceania, 1999b). According to IFTA, a result of lower trade prices is that *O. goliath* will be increasingly sold as cheaper framed specimens for tourists (Hudson *in litt.* to TRAFFIC Oceania, 1999b).

Illegal trade of insects from Papua New Guinea is suspected, involving residents and overseas traders exporting specimens without permits (Clark, *in litt.* to TRAFFIC Oceania, 1999a).

CONSERVATION MEASURES

Indonesia: Wild specimens are reportedly banned from commercial capture and export (Anon. 1993). The species is protected by Decree of Ministry of Agriculture No. 576/Kpts/Um/8/1980, Decree of Ministry of Agriculture No. 716/Kpts/Um/8/1980 and Act No. 5 of 1990 regarding Conservation of Natural Resources and its Ecosystem; followed by Decree of Ministry of Forestry No. 301/Kpts-11/1991 of 10 June 1991, and Decree of Ministry of Forestry No. 882/Kpts-11/1992 of 8 September 1992 (TRAFFIC Southeast Asia *in litt.* to TRAFFIC International, 1999). No export quotas for specimens of this species were issued in the period 1995-1999.

Papua New Guinea: *O. goliath* is listed as Protected under the Fauna (Protection and Control) Act of 1976. Protected species can only be taken for traditional purposes and, consequently, they are

effectively prohibited from commercial use. Section 29 of the Act, however allows the Minister to permit protected species to be taken for "specific purposes". Since 1987, this provision has been used to allow certain protected birdwings to be traded commercially. A later Notice under Section 29 (Taking of Protected Animal for Special Purpose) was gazetted in 1990 which allowed the farming and export of farmed *O. goliath* specimens (Antram, *in litt.* to TRAFFIC Oceania, 1999). The term 'farmed' is not defined but, as other conditions require the release of a percentage of adult specimens to the wild to maintain viable breeding populations, and the setting-aside of natural habitat for conservation of the species, the inference is that the butterflies should be bred in captivity. Two organisations have been granted permission to export these species, IFTA and WEIR (Antram, *in litt.* to TRAFFIC Oceania, 1999). This legislation allows the IFTA and WEIR to self-determine the appropriate percentages of adults released and monitoring. Antram (*in litt.* to TRAFFIC Oceania, 1999) questions the regularity that organisations such as WEIR and IFTA inspect the village ranching communities to ensure the release of a percentage of adult stock.

No export limits have been set by the Papua New Guinea Office of Environment and Conservation for exporters of *O. goliath*. As a CITES-listed species, *O. goliath* is also subject to export control under the International Trade (Fauna and Flora) Act of 1983 (Antram, *in litt.* to TRAFFIC Oceania, 1999).

As noted above, planting of the larval food plant *Aristolochia crassinervia* may reportedly allow rapid local increase of populations of *O. goliath*. However, no quantitative assessment of the effects of such supplementary planting appears to have been carried out.

CAPTIVE-BREEDING

Indonesia: Captive-breeding is said to have been initiated, with five pairs reportedly producing 244 captive-bred adults in Ambon and 484 butterflies ready for export in Irian Jaya (Anon., 1993). Further details are lacking.

Semi-natural butterfly farming by residents around Arfak reserve has been initiated by YBLBC (Muskita, 1995).

Papua New Guinea: IFTA have carried out captive-breeding trials, but found their results produced smaller inferior butterflies (Clark, *in litt.* to TRAFFIC Oceania, 1999b).

The species is currently ranched by the Insect Farming and Trading Agency (IFTA) and the Wau Ecology Institute Insect Ranch (WEIR).

With regard to ranching, exporters obtain specimens by instructing villagers on planting *Aristolochia crassinervia* and how to collect specimens so that they are suitable for trade purposes. Boxes of live pupae are bought from participating villages and then hung on pins on the wall until the imagoes emerge. They are transferred to a small cage until their wings are fully extended and dry, and then killed by injection and set (Antram *in litt.* to TRAFFIC Oceania, 1999).

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Ornithoptera rothschildi Kenrick 1911

Rothschild's Birdwing
Ornithoptère de Rothschild

Order: LEPIDOPTERA

Family: PAPILIONIDAE

SUMMARY

A butterfly that has a restricted montane distribution in the Arfak area, north-western Irian Jaya, Indonesia. No overall population data are available but the species is categorised as Vulnerable by IUCN. Some populations have reportedly increased as a result of habitat enrichment associated with a ranching programme. Reported international trade during the period 1991-1996 amounted to about 4,000 individuals, all originating in Indonesia and well over half of them reported in 1996. Over 25% of the trade in 1995 and 1996 was reported by importing countries as wild-caught specimens, whereas all exports reported by Indonesia in these years were declared as captive-bred or ranched. Given the status of the species in the wild it is important that the origin of specimens in trade is clear and unambiguous.

The species is recommended under Decision 10.79 for inclusion in category d (ii).

DISTRIBUTION AND POPULATION

Globally categorised as 'Vulnerable' (IUCN, 1996).

Indonesia: *Ornithoptera rothschildi* is a little-known birdwing with a restricted distribution at high elevations in the mountains of the Arfak area, north-western Irian Jaya, Indonesia.

No overall population data are available. Some populations of *Ornithoptera rothschildi* have reportedly increased in numbers as a result of habitat enrichment as part of a butterfly ranching project around Arfak Nature Reserve (Neville *in litt.* to IUCN/SSC Wildlife Trade Programme, 1999 and see below).

HABITAT AND ECOLOGY

A montane species, occurring in sheltered valleys and ravines that are sunny and protected from strong winds, at altitudes of between 1,800 m and 2,450 m. Virtually nothing is known about its ecology (Collins and Morris, 1985).

THREATS TO SURVIVAL AND DOMESTIC USE

Deforestation was reported as the main threat in the mid-1980s (Collins and Morris, 1985).

Butterfly ranching activities have been developed around Arfak Nature Reserve involving this species and five others (*O. goliath*, *O. priamus*, *O. paradisea*, *O. tithonus* and *Troides oblongomaculatus*). A foundation, Yayasan Bina Lestari Bumi Cendrawasih (YBLBC), was established with the involvement of WWF Indonesia, the Directorate-General of Forest Protection and Nature Conservation (PHPA) and local communities. The programme began in 1987 but ranching activities (chiefly involving habitat enrichment through the planting of food plants, generally in buffer areas around the Arfak Reserve) reportedly did not get under way in earnest until 1993 (Muskita, 1995).

Ornithoptera spp., including *O. rothschildi*, have been observed for sale in Jakarta, where good quality specimens of *Ornithoptera* spp. were offered for IDR 100,000-150,000 (approximately US\$ 11-17) in 1999. It is believed likely that the species is also available in other large Indonesian cities (TRAFFIC Southeast Asia, *in litt.* to TRAFFIC International, 1999).

INTERNATIONAL TRADE

Gross reported trade from 1991-1996 totalled 4,019 'bodies', a further 78 'specimens', also likely to be bodies, and 270 live animals, all of which were reported as originating in Indonesia. Over 25% of the trade in the years 1995 and 1996 has been reported by importing countries as wild-caught specimens, despite commercial export of these being banned by Indonesia. All exports reported by Indonesia in 1995 and 1996 were declared as either captive-bred or ranched (Indonesia did not report the origin of

exports for the years 1992-1994). In all years from 1993 onwards, exports reported by Indonesia (which were on the basis of permits issued and not actual specimens exported) were considerably higher than reported imports from Indonesia so that it is very likely that the same specimens were declared as wild-caught by the importers and captive-bred or ranched by Indonesia.

Gross exports of *Ornithoptera rothschildi*

TERM	UNIT	CTRY	1991	1992	1993	1994	1995	1996	Total	Average
BOD	AU		0	0	0	0	0	2	2	0.3
BOD	CA		0	0	2	58	0	2	62	10.3
BOD	DE		0	0	0	0	0	2	2	0.3
BOD	ID		0	0	260	546	470	2649	3925	654.2
BOD	SG		0	0	2	0	10	0	12	2.0
BOD	US		0	2	0	2	8	4	16	2.7
LIV	ID		0	0	0	160	60	50	270	45.0
SPE	ID		0	0	0	0	0	50	50	8.3
SPE	US		0	0	0	2	0	26	28	4.7

In the mid-1980s it was reported that "the very considerable trade in this species has caused comment and concern. High prices were originally quoted when specimens first became available, but by 1982 pairs were selling for £10 or less" (Collins and Morris, 1985). However, no quantitative information on trade volumes during that period is available.

In 1999, pairs of *O. rothschildi* from Irian Jaya were advertised by an Australian company on the internet for prices ranging from AU\$15.95 (US\$10) to AU\$24.95 (US\$16) (Anon., 1999).

CONSERVATION MEASURES

Indonesia: The species is protected by Decree of Ministry of Agriculture No. 576/Kpts/Um/8/1980, Decree of Ministry of Agriculture No. 716/Kpts/Um/8/1980 and Act No. 5 of 1990 regarding Conservation of Natural Resources and its Ecosystem; followed by Decree of Ministry of Forestry No. 301/Kpts-11/1991 of 10 June 1991, and Decree of Ministry of Forestry No. 882/Kpts-11/1992 of 8 September 1992. No export quotas for specimens of this species were issued in the period 1995-1999.

There appear to be no quantitative data on the impact of the ranching operations described above on populations of this species.

CAPTIVE-BREEDING

Indonesia: In 1993 it was reported that captive-breeding has been initiated, with 301 'ready for export' butterflies said to have been produced in Irian Jaya (Anon. 1993). Further details are lacking.

Semi-natural butterfly farming by residents around Arfak reserve (including *O. rothschildi*) has been initiated; a co-operative venture involving WWF Indonesia (WWF/IP), Yayasan Bina Lestari Bumi Cendrawasih [an NGO established with WWF/IP assistance] (YBLBC), the Directorate-General of Forest Protection and Nature Conservation (PHPA) and local communities) (D. Neville *in litt.* to IUCN/SSC Trade Programme, 1999; Muskita, 1995).

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Pandinus imperator (Koch 1842)

Emperor Scorpion
Escorpión emperador

Order: SCORPIONES

Family: SCORPIONIDAE

SUMMARY

This African scorpion is poorly known and even the limits of its distribution are unclear. It is, unusually for a scorpion, a social species and has a *K*-selected breeding strategy, making rapid recovery from over-collection unlikely. Reported international trade in the two years since listing in the CITES appendices, amounted to 105,650, and mainly originated in Ghana, Togo and Benin. Since the status of the species in these countries is completely unknown it requires further investigation.

The species is recommended under Decision 10.79 for inclusion in category d (ii).

DISTRIBUTION AND POPULATION

The proposal to include *Pandinus dictator*, *P. gambiensis* and *P. imperator* in Appendix II of CITES (CITES Doc.9.47 Nos.63-65) stated that: 'The distribution of the three species covered by this proposal is uncertain, especially at the borders of their ranges, and the literature on the subjects is confusing.' (Anon, 1994).

The distribution of *P. imperator* was given in the proposal (CITES Doc.9.47 Nos.63-65) as: 'Benin, Chad, Côte d'Ivoire, Senegal, Liberia, Ghana, Guinea, Sierra Leone and Togo. However, as earlier workers considered *P. gambiensis* to be a subspecies of *P. imperator*, the records from Senegal probably refer to that species (Vachon, 1967)'.

'A subspecies, *P. i. subtypicus*, was described from "East Africa" in 1984. Lamoral and Reynders (1975) list specimens identified as *subtypicus* from Eritrea, Sudan and Somalia. However, Karl Kraepelin, who described this subspecies, suggested that *subtypicus*, which reaches only 100 mm. in length, was probably a separate species in his 1899 review of the genus (Kraepelin, 1899). Vachon (1967) considered that *P. imperator* was confined to west Africa (D. Sissom *in litt.* to IUCN Trade Programme, 1999) therefore synonym of another east African species, is probably distinct from *imperator*'.

'Lamoral and Reynders (1975) also list specimens identified as *imperator* from Eritrea, Ethiopia, Gabon, Malagasy Republic, and Nigeria. Except for the last named, these records, all from old museum specimens, probably represent either misidentifications or labelling errors (D. Sissom *in litt.* to IUCN Trade Programme, 1999). The record from Gabon (and possibly from Nigeria as well) may refer to *P. dictator*. No *Pandinus* scorpion is known to occur in the Malagasy Republic.'

'This proposal is therefore written on the assumption that *P. imperator* is confined to the countries listed by Vachon (1967), with the exception of Senegal where it probably does not occur, and Nigeria where it may.'

However, Vachon (1967) actually wrote:

'L'espèce *imperator*, dont malheureusement on ne connaît pas le lieu de capture du type en Afrique de l'Ouest, a une vaste répartition puisqu'on la signale du Sénégal au Tchad et en Libéria, en Guinée, en Sierra Leone, en Côte-d'Ivoire, au Ghana, au Togo, au Dahomey alors qu'une autre espèce: *Pandinus dictator* (POCOCK) la remplace plus à l'Est, au Cameroun.'

This indicates that he had reason to believe that it also occurred in the countries in between Senegal and Chad, i.e. Mali, Burkina Faso and Niger. Although he identified the specimens he examined (number not stated) from Gambia and Senegal as *P. gambiensis* he did not apparently examine the specimens from Senegal referred to by Thorell (1893) in Museo Florence and Werner (1936) in Zoologische Museum, Hamburg, and nowhere suggested that *P. imperator* does not occur in Senegal. He did make reference to Frade (1948) and it is clear that Frade's specimens from Guinea-Bissau should be referred to *P. gambiensis*. He made no reference to Nigeria but this does not warrant the exclusion of this country from the list of range states for the species. The taxon *subtypicus* has never been treated as anything other than a subspecies of *P. imperator* and, since the listing proposal was for

the inclusion of *Pandinus imperator* in Appendix II and did not specifically exclude *P. i. subtypicus*, the latter must be treated as listed.

Based on the taxonomy and list of museum specimens in Lamoral and Reynders (1975), who treated *Scorpio africanus* Linnaeus 1748 (which has no valid taxonomic status), and *Heterometrus roeseli* as synonyms, and *Scorpio africanus subtypicus* as a subspecies, the following are potential range states:

P. i. imperator:

Benin: Listed by Vachon (1967) without further details.

Chad: Listed by Vachon (1967) without further details. Not mapped as occurring by Lourenço and Cloudsley-Thompson (1996).

?Democratic Republic of Congo: *Pandinus imperator*, Upemba National Park (Roewer, 1952).

Perhaps a misidentification or labelling error, but no other *Pandinus* species is apparently recorded from this country.

Côte d'Ivoire: Listed by Vachon (1967) without further details. Two ecotypes, corresponding with forest and savanna populations, have been found (Lourenço and Cloudsley-Thompson, 1996).

Equatorial Guinea: *Scorpio roeseli*, Fernando Po [= Bioko] (Pocock, 1888 and 1899). Note that specimens of both this species and *P. dictator* were examined by Pocock (1899) so misidentification of the former is perhaps unlikely.

?Ethiopia: *Scorpio africanus* (Kraepelin, 1894). Perhaps a misidentification or labelling error (Anon., 1994).

?Gabon: *Pandinus imperator (typicus)* (Kraepelin, 1899). Perhaps a misidentification or labelling error (Anon., 1994).

[Gambia: *Scorpio roeseli* (Pocock, 1888). Although listed for Gambia by Pocock (1888) this country is not mentioned in Pocock (1899) and it seems likely the specimens had subsequently been referred to *P. gambiensis*.]

Ghana: *Pandinus imperator*, Ashanti, Axim (Pocock, 1899), *Scorpio africanus* (Kraepelin, 1894), *Scorpio roeseli* (Pocock, 1888).

Guinea: *Heterometrus roeseli*, 'de la côte de Guinée' (Simon, 1872); may refer to *P. gambiensis* since the habitat at this location is similar to that found in Guinea-Bissau, in which case *Heterometrus roeseli* should be treated as a synonym of *P. gambiensis*, rather than of *P. imperator*. *Pandinus imperator*, Mont Nimba, Zouepo (Vachon, 1952).

?Guinea-Bissau: *Pandinus imperator* (Bacelar, 1950). The specimens mentioned by Frade (1948) were referred to *P. gambiensis* by Vachon (1967) and this may well apply to Bacelar's specimens.

Liberia: Listed by Vachon (1967) without further details.

[Madagascar: *Scorpio africanus* (Kraepelin, 1894). No *Pandinus* species is known to occur in the country (Anon., 1994).]

Nigeria: *Pandinus imperator*, Asaba, Ilo [= Illo], Jébbé [= Jebba], Onitsha (Pocock, 1899), Olokemeji (Borelli, 1913), Badagry (Werner, 1936), *Scorpio roeseli*, Onitsha (Pocock, 1888). Nigeria is excluded from the list of range states by Anon. (1994), without good reason. Mapped as occurring by Lourenço and Cloudsley-Thompson (1996).

?Senegal: *Pandinus africanus*, Saint Louis (Thorell, 1893), *Pandinus imperator* (Werner, 1936). May be referable to *P. gambiensis* (Anon., 1994).

Sierra Leone: Listed by Vachon (1967) without further details. Not mapped as occurring by Lourenço and Cloudsley-Thompson (1996).

?Somalia: *Pandinus africanus*, Obbia, Ogaden (Pavesi 1895, 1897). Perhaps a misidentification or labelling error.

?Tanzania: *Scorpio africanus*, Mpwapwa (Kraepelin, 1898). Perhaps a misidentification or labelling error.

Togo: *Pandinus imperator*, Wegbe [= Wogba] (Pocock, 1899), Misahöhe, Sansanne Mangu [= Mango] (Roewer, 1943), Atakpama [= Atakpamé] (Werner, 1902), north (Werner, 1936).

Until the relevant specimens have been re-examined to correct possible misidentifications it is not possible to determine the complete distribution of the species.

P. i. subtypicus:

Eritrea: Habab (Moriggi, 1941).

Somalia: (Caporiacco, 1927), Belà, Mogadiscio, Obbia, Ogaden (Moriggi, 1941).

Sudan: Djur region (Kraepelin, 1899).

There are few data relating to the populations of this species. Anon. (1994) noted that it 'is becoming increasingly harder to locate and is probably in decline, at least locally.'

In Comoé National Park, Côte d'Ivoire, D. Mahsberg (in IUCN Species Survival Commission and TRAFFIC Network, 1994) recorded between three and five *P. imperator* burrows per 100 m².

HABITAT AND ECOLOGY

D. Mahsberg (*in litt.* to IUCN/SSC Wildlife Trade Programme, 1999) provided details of the life history: age to maturity more than two years, longevity (captive individuals) > 10 years; gestation about one year; mean litter size about 20; iteroparous, breeding interval in the field may be in a two-year cycle; adult males probably solitary; family groups (mother and young) persist for two to three years in subterranean burrows. Sociality in these scorpions seems to have evolved to avoid predation on young. *P. imperator* occurs in a wide variety of habitats in West Africa, but it is more often found in savannahs and gallery forests than in the closed primary forest. These scorpions are typical sit and wait predators and spend most of their lifetime in a burrow (in termite mounds, abandoned burrows of mice or in self-constructed dens) or under a shelter (logged wood etc.). They may be diurnal during the rainy season, and after heavy rains they may leave their burrows and walk around (dispersal, seeking protection against flooding). Finally, he found it to be one of the top arthropod predators in the Comoé National Park and to be adapted to fluctuating prey availability (in this case to peaks in activity of termites *Macrotermes* spp. in the wet season).

THREATS TO SURVIVAL AND DOMESTIC USE

D. Mahsberg (in IUCN Species Survival Commission and TRAFFIC Network, 1994) believed that *P. imperator* is vulnerable to factors such as deforestation and dehydration of tropical habitats, which negatively affect the termite prey species. Because of its social organisation, he also believes the species to be vulnerable to high levels of local collection for trade. If a burrow is found it is easy to dig it out and in many cases whole family groups can be captured. According to M. Braunwalder (in IUCN Species Survival Commission and TRAFFIC Network, 1994), intensive agriculture and inappropriate use of fertiliser and pest control products may also have an impact on these species.

Pandinus species have a *K*-selected breeding strategy, producing small litter sizes (average of 20 young) over long gestation periods (e.g., 370 days) due to their life-history rapid recovery of heavily collected populations is, therefore, unlikely (IUCN Species Survival Commission and Traffic Network, 1994).

INTERNATIONAL TRADE

Since the species was only listed in the CITES appendices on 16 February 1995 the available trade data are restricted to 1995 and 1996. Total gross reported trade in these two years amounted to 105,650. The main exporters were Ghana (61.5%), Togo (25.6%) and Benin (10.2%).

Virtually all *P. imperator* were reported as live wild specimens; a total of 1,600 reported by importing countries as captive-bred in Benin seems unlikely to be correct given that the species is rarely bred (see Captive-breeding). M. E. Braunwalder (*in litt.* to IUCN/SSC Wildlife Trade Programme, 1999) suspected that these specimens are the offspring of wild females which were born in the short transit time between collection and export. The main importers were the United States, the European Union and Japan.

As of March 1999 WCMC had not received Benin's 1995 and 1996 CITES Annual Reports. Consequently imports, exports and re-exports recorded by Benin are were unavailable for the present study.

During 1996 the USA reported the re-export of 89 live specimens of South African origin to Canada (4) and Japan (85). As *P. imperator* does not occur in the wild in South Africa (see Distribution) it seems possible that either the true origin of these specimens was misreported, there was a misidentification of the scorpion species involved, or that these were specimens of *P. imperator*.

previously imported into South Africa from a range state and re-exported to the USA without details available as to their original origin.

It is difficult even for experienced scorpion taxonomists to distinguish between *P. imperator* and *P. dictator*; it is possible only through examination, with a powerful lens or microscope, of the trichobothria (sensory bristles) of dead specimens (IUCN SSC and TRAFFIC Network, 1994. As most of the reported trade is in live specimens, it is possible that there is frequent misidentification of the species involved.

Gross exports of *Pandinus imperator*

TERM	UNIT	CTRY	1995	1996	total	average
BOD		BJ	19	0	19	9.5
BOD		CF	22	0	22	11.0
BOD		TH	0	314	314	157.0
LIV		BE	0	2	2	1.0
LIV		BJ	6429	4347	10776	5388.0
LIV		CA	0	60	60	30.0
LIV		CH	6	0	6	3.0
LIV		DE	76	62	138	69.0
LIV		FR	3	0	3	1.5
LIV		GH	22297	42715	65012	32506.0
LIV		HU	1	0	1	0.5
LIV		TG	16810	10200	27010	13505.0
LIV		US	967	1320	2287	1143.5

The table below gives export figures from Ghana from various sources, which add a number of years to those available from CITES data.

Exports of *Pandinus imperator* from Ghana

Year	Number (Anon. 1994)	Number (Wildlife Dept, Ghana <i>in litt.</i> 1999)	Number (Exports reported by Ghana)	Number (Gross exports from Ghana)
1978	122			
1979	417			
1980	0			
1981	150			
1982	300			
1983	900			
1984	560			
1985	3,400			
1986	911			
1987	4,520			
1988	8,790			
1989	3,775			
1990	8,100			
1991	7,247	9,647		
1992	9,535	14,205		
1993	3,040	7,845		
1994	5,690 (Jan.-May)	13,367		
1995		20,626	20,626	22,297
1996		42,469	41,969	42,715

The retail price advertised on the internet in the USA in 1999 was US\$10 per animal.

CONSERVATION MEASURES

None known.

CAPTIVE BREEDING

D. Mahsberg (*in litt.* to IUCN/SSC Wildlife Trade Programme, 1999) stated 'there are no breeding operations or intensive management operations on any scorpion species. *Pandinus imperator* may be bred in captivity, but this will take a long time and is of no economic value for the pet trade. *Pandinus* kept under appropriate conditions, may reproduce several times and for several generations, but most of the "breedings" come from the import of pregnant females.'

Lamont (1994) provided details of housing, feeding and breeding *P. imperator*, and Garnier (1974) covered housing and rearing of the species.

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