



NDF WORKSHOP CASE STUDIES
WG 7 – Reptiles and Amphibians
CASE STUDY 3

Malacochersus tornieri

Country – KENYA

Original language – English

CONSERVATION, MANAGEMENT AND CONTROL OF TRADE IN PANCAKE TORTOISE *MALACOCHERSUS TORNIERI* (SIEBENROCK, 1903) IN KENYA: THE NON-DETRIMENT FINDING STUDIES CASE STUDY

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I. BACKGROUND INFORMATION ON THE TAXA

1. BIOLOGICAL DATA

1.1. Taxonomy

Class:	Reptilia
Order:	Testudinata
Family:	Testudinidae
Scientific name:	<i>Maalacochersus tornieri</i> (Siebenrock, 1903)
Common names:	English: Pancake tortoise Swahili: Kobe

1.2. Distribution of Pancake tortoise (*Malacochersus tornieri*) population in Kenya

Pancake tortoise is a rock crevice-dwelling tortoise and inhabits patchy microhabitats of rock outcrops and kopjes discontinuously distributed throughout the drylands of Kenya. Its distribution overlaps with that of Precambrian rocks of the basement complex system mainly in agro-climatic zone V. The distribution ranges from south-eastern to northern parts of the country and covers seven districts namely: – Kitui and Mwingi (Greater Kitui), Tharaka,(greater Meru), Mbeere (greater Embu), Samburu, Isiolo and Marsabit.

The species distribution range is characterized mostly by thorn—bush land, thickets, *Acacia—Commiphora* woodland and grassland. Altitude influences distribution of optimal microhabitats for the species. The distribution is therefore patchy with aggregated populations.

The populations are discontinuously scattered from southeastern to northern parts of the country from Kitui to Samburu districts respectively with Kiasa and Ithumba hills within Tsavo East National Park north of Galana river as the southern limit and Ngurunit area on the eastern slopes of Ndotto Mountains with a small spill over population in Marsabit district as the northern limit of the species distribution. Pancake tortoise prefers well-sheltered rock crevices with the inhabited rock crevices orientation varying from horizontal to vertical inclination. This accounts for the species patchy and discontinuous distribution. The limited suitable rock crevices regulate population size and distribution.

The species occurs in both protected and non-protected areas within its range. However the population in protected areas is proportionally very small (less than 5%) in comparison with that outside estimated to account for over 95% of the country's species population.

Generally, Pancake tortoise population distribution in Kenya can therefore be grouped into two; southern sub-population whose distribution covers Kitui, Mwingi, Tharaka and Mbeere and the northern sub- population covering Samburu, Isiolo and Marsabit districts.

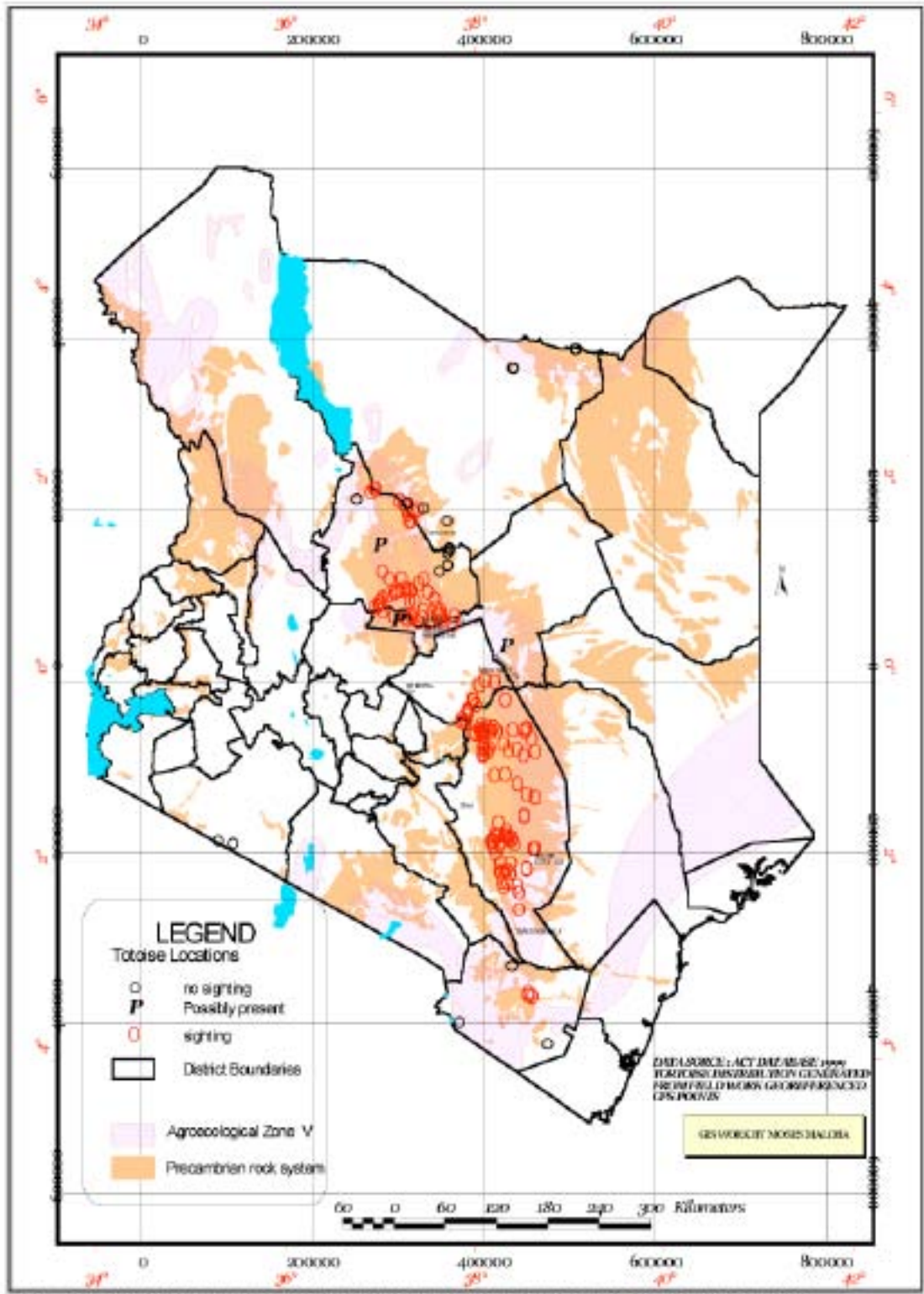


FIG. 2 Map Showing Distribution of pancake tortoise overlapping with precambrian rocks and agroecological zone V in Kenya 2002.

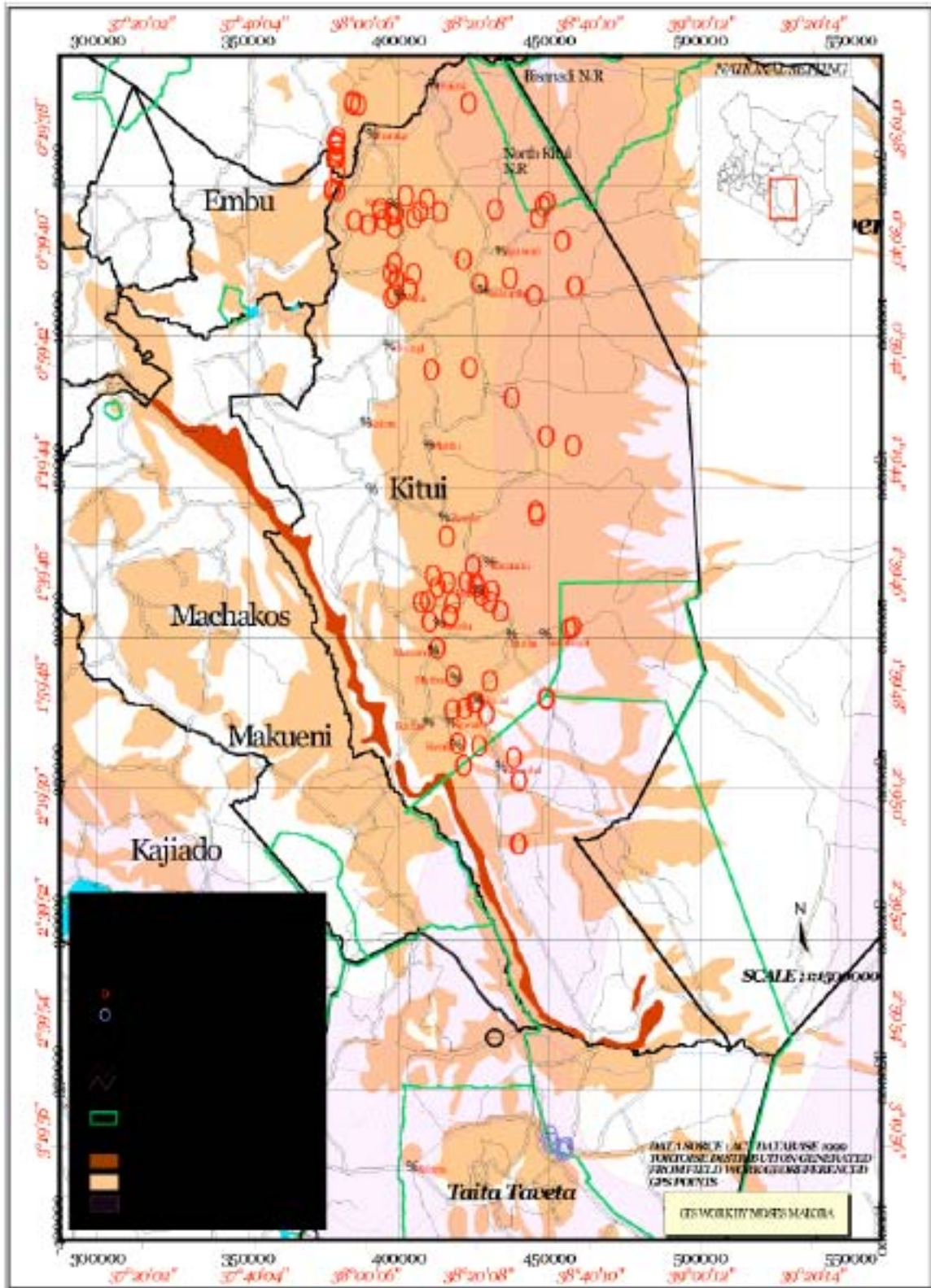


FIG. 3 Map Showing Distribution of pancake tortoise in Kitui & Mwingi (greater kitui) districts 2002.

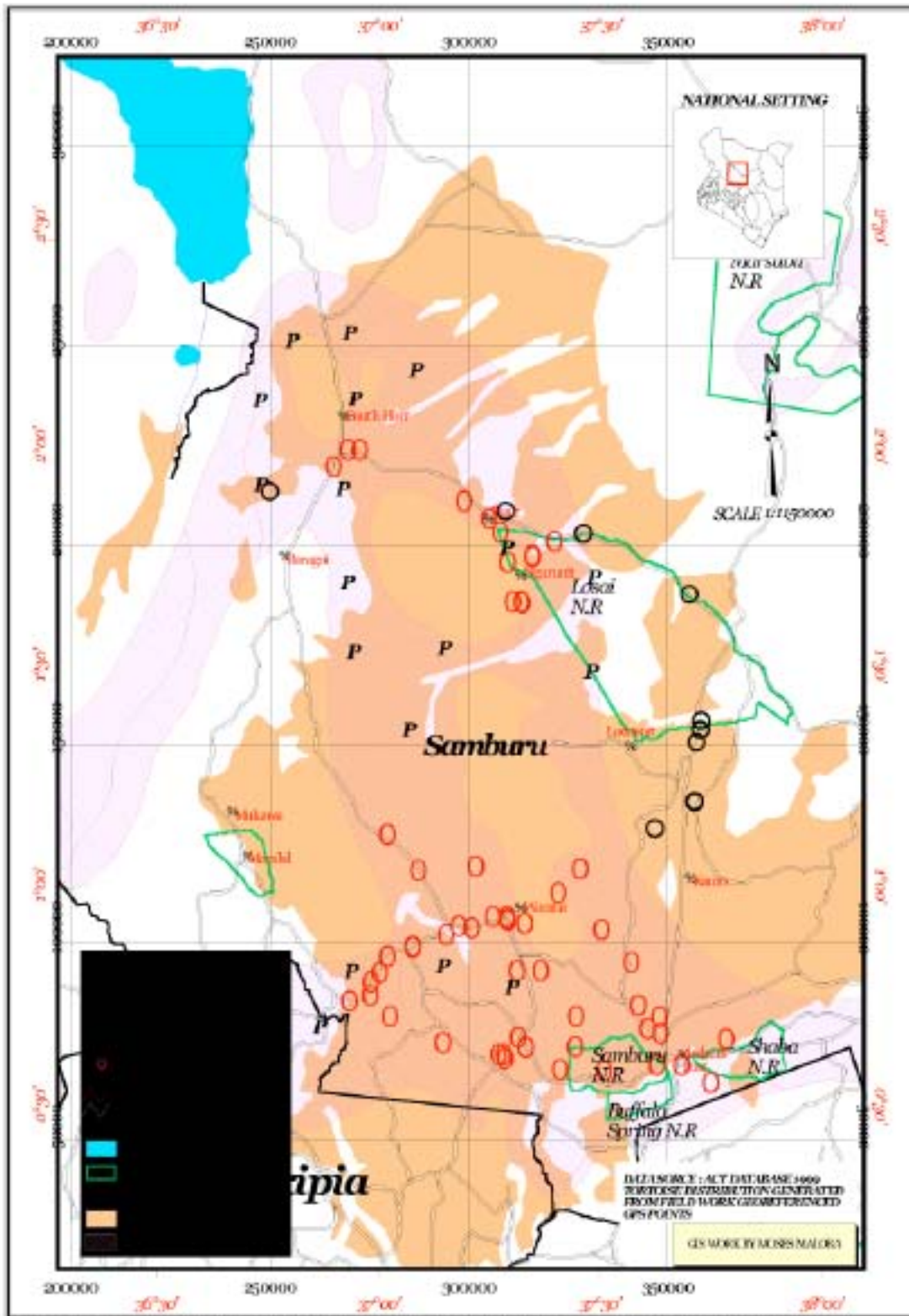


FIG. 5 Map Showing Distribution of pancake tortoise in isiolo marsabit and samburu districts 2002.

1.3 Biological characteristics

1.2.1. Life History

Pancake tortoise, *Malacochersus tornieri* is a small soft shelled dorso-ventrally flattened rock crevice inhabitant. The shell is flattened and flexible and enables it to push and wedge itself in rock crevices. This unique appearance and behavior makes the species popular in the international pet trade.

Body structure (morphology) of Pancake tortoise



Horn colored adult specimen (With carapace geometric pattern lost)



Carapace abnormality ((4th vertebral scute divided into three)



Plastron segment showing "V" shaped caudal/ posterior scute



Normal carapace with geometric pattern abnormal carapace

Maximum body weight of 560g and a straight-line carapace length of 171mm for an average adult specimen has been recorded (Kyalo et al., 2001)

Measurements of 228 tortoises showing mean and range of body weight in grams and length in millimeters.

Measurement	Females (n=130)	Males (n=98)
Mean Carapace Length \pm 1SD	141.98 \pm 15.35	135.21 \pm 29.84
Range	82.65-157.33	105.37-165.05
Mean Body weight \pm 1SD	355.88 \pm 93.32	310.16 \pm 128.72
Range	262.56-449.20	181.44-438.88

Other available recorded field data gives the maximum body length (Straight Carapace Length) of an average adult Pancake tortoise as 180mm and body weight of 500g (Moll & Klemens 1996). Malonza (1999) recorded maximum body weight of 510 g and Straight Carapace Length of 175mm for average adult specimens.

In captivity, females may lay eggs up to five times per year (Schmalz & Stein, 1994; Vinke & Vinke, 2000); usually only a single egg is laid each time, but two or even three eggs have occasionally been reported (Ernst *et al.*, 2002; Ewert *et al.*, 2004). In captive animals, the period between nesting may be from 21 to 71 days.

The reported age at first reproduction of captive animals ranges from about 5 to 9 years (Riener, 1999; Schmidt, 2004). Reproductive data from the wild are scarce; they indicate that females lay only a single egg at a time, and show that not all mature females reproduce each year (Malonza, 2003).

1.2.2. Habitat types

Habitat requirements for Pancake tortoise are very specific. The optimal habitat is a function of geology, climate, vegetation and altitude (Kyalo 2002, Malonza 1999). Pancake tortoise lives only where rock crevices of suitable dimensions are found in thorn scrub and savannah of the Somalia-Masai floristic region characterized with *Acacia-Commiphora*, vegetation. Common plant species in the species habitat range include *Starcular rhynchocarpus*, *Starcular stenocarpus*, *Commiphora boiviana*, *Commiphora edulis*, *C. bildbraedii*, *C. baluensis*, *Boscia vascular*, *Euphorbia spinaceous*, *Barchenia neglecta*, *Terminalia spp*, and *Delonyx elata*. This vegetation and therefore the Pancake tortoise habitat occur within altitudes of 400-1600 M above sea level.

Pancake tortoises occur only in rock crevices of specific dimensions in exfoliating granite rock outcrops. The high temperatures experienced in the arid and semi arid lands influence development of the suitable crevices. The orientation of the optimal crevices varies from horizontal through diagonal to vertical with all degrees of inclination between the extremes (Wood & Mackay 1993, Moll and Klemens 1996, Malonza 1999).

The most suitable crevices are quite deep and have uncluttered rock floors to give grip to the tortoise during movements inside. The crevices are near a convenient route to the ground and are usually tapered to a height of between 3-8 centimeters to allow the tortoise a place to wedge itself for protection. Depending on the availability of the optimal crevice in any rock outcrop and the presence of a suitable route to the ground, the Pancake tortoise can occupy a crevice at a height of up to 1.5 meters or even higher from the ground. The crevices are normally found in exfoliating outcrops forming rock slabs or boulders that overlay each other forming the crevice at some point of the convergence.

The suitable crevices and therefore microhabitats for the Pancake tortoise are often a small proportion of the crevices in any given species range area. Large areas of unsuitable habitats separate the suitable habitats. The species microhabitats are sparse and few consequently accounting for low species population densities.

Natural habitats for Pancake tortoise



Orientation of rock crevices inhabited by Pancake tortoises



a) Horizontally inclined crevice (Ndulani area, Kitui district)



b) Diagonally inclined crevice (Namunyak conservancy area, Samburu district)



c) vertically inclined crevice, (Nokowarak area, Samburu district)

1.2.3. Role of the species in its ecosystem

Pancake tortoises feed predominantly on a variety of herbs and succulent plants, but also consume some beetles and other animal matter. The species occur micro-sympatrically with tawny plated lizard, *Gerrhosaurus major*, white throated savanna monitor, *Veranus albigularis*, Puff – adder, *Bitis arietans*, black –necked spitting cobra, *Naja nigricollis*, five –lined skink, *Mabuya quinquetaeniata* and red –headed rock agama, *Agama agama lionotus*.

1.3. Population

1.3.1. Global population size

The global population of Pancake tortoise in the wild is not known. This species occurs in fragmented populations in Kenya, Tanzania and recently in 2004 established to occur in North-eastern Zambia.

1.3.2. Current Global population trends

increasing decreasing stable unknown

The current global population is reduced but stable

1.4. Conservation status

1.4.1. Global conservation status

Critically endangered Near Threatened
 Endangered Least concern
 Vulnerable Data deficient

M. tornieri is listed under IUCN as Vulnerable species (IUCN 1996). All wild populations of *Malacochersus tornieri* were first listed in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) on July 1975 calling for controlled trade of the species through use of permits.

Currently, there is a trade moratorium on specimens collected from the wild and therefore legal trade in the species only involves specimens bred in captivity.

1.4.2. National conservation status

The Pancake tortoise is uncommon considering that the population is restricted to only areas with optimal habitat characteristics it specifically requires. The species abundance and density is a function of the habitat quality. Well-oriented rock crevices, high vegetation cover over the rock outcrop and less human habitat destruction are characteristics of high quality habitat for the species.

The abundance of Pancake tortoise qualitatively varies from area to area depending on the availability and number of suitable microhabitats. The species population densities differ from one site to the other. This change in densities is a function of habitat preference. Suitable crevices accommodate solitary, pair as well as multiple assemblages of Pancake tortoise.

In undisturbed habitats with well-vegetated rock outcrops, frequency of encounter and occurrence of multiple assemblages and the-

before relative high population densities are recorded. The frequency of optimal habitat for the species and level of its disturbance determine the abundance and distribution of the species.

Establishment of the species population size in its entire range in Kenya has not been done. However, determination of the species density in selected sampling sites has been crucial to give an indication of the species abundance and distribution in the country.

The species densities range from 8.86 specimens/ Km² in Voo, Kitui as the highest, 6.60 in Katse, Mwingi, 2.95 in Endau Kitui, 2.61 in Wamba, Samburu, 1.73 in Ishiara, Mbeere, 1.72 in Chiakariga, Tharaka and 1.20 in Nguni, Mwingi

Representative Pancake tortoise sample count site-Voo in Kitui(2002)

Transect Route Name	Transect size (Km ²)	No. of specimens Counted	Density Specimens/ Km ²
Voo-Kalalani	1.0	33	33
Voo-Kemwaa	3.5	13	3.71
Voo-Kyaango-Kithanake	9.50	31	3.26
Voo-Kinakoni	8.0	25	3.125
Kyaango-Kinakoni	5.0	6	1.20
Mean Density			8.86

1.4.3. Main threats to Pancake tortoise in Kenya

- No Threats
- Habitat Loss/Degradation (human induced)
- Invasive alien species (directly affecting the species)
- Harvesting [hunting/gathering]
- Accidental mortality (e.g. Bycatch)
- Persecution (e.g. Pest control)
- Pollution (affecting habitat and/or species)
- Other _____
- Unknown

Habitat alteration and destruction as a result of slash-and-burn shifting cultivation, charcoal burning, rock slab and ballast extraction and collection for international trade are the threats to Pancake tortoise population in the wild.

Commercial charcoal burning as well as commercial ballast and rock slabs extraction and slash-and-burn shifting cultivation are the common threats to the southern subpopulation of the Pancake tortoise.

Exploitation of the Pancake Tortoise for international trade is the only significant human utilization of the species. Pancake tortoises have been popular display animals in zoos and among private hobbyists. Trade in the species has been significant in recent decades such that when compounded with the threat of habitat alteration and loss, the species is now rated "vulnerable" on the IUCN Red List. Collection of specimens of the species for international trade has been identified as a major threat to the species population in areas around Nguni, Mataka and Katse in Mwingi district and in Kianjeru, Mbeere district

In Samburu, Isiolo and Marsabit districts where the local people are nomadic pastoralist, the species is not threatened per se as there is little habitat destruction caused by livestock grazing; a land use practice which has insignificant threat to the species survival.

2. MANAGEMENT OF PANCAKE TORTOISE IN KENYA

2.1. Management Measures

2.1.1. *Management history*

International trade in the species has been regulated under CITES Appendix II since 1975. In Kenya, trade in specimens of the species is restricted to those from breeding operations. No collection of the species from the wild for commercial trade is currently allowed.

In 2000, Kenya put forward to the CITES 11th Conference of the Parties a proposal for inclusion of the species in CITES Appendix I. This proposal was however withdrawn following results of findings of the CITES Animals Committee mission to Tanzania in 1998 and further due to recommendations for development of strict management measures for captive breeding and trade of the species. These strict management measures complement the CITES trade regulation and management with the aim to meet legitimate demand for the species with animals produced in a manner that minimizes impact on wild populations and provides financial returns to the species range State.

At the 12th Conference of the Parties in 2002, and based on information generated through a national survey in 2001-2002 of the species population distribution in Kenya, Kenya proposed introduction of a CITES resolution that would direct the Animals Committee to:

- 1) review the biology, genetic variability, conservation status and distribution of this species in the wild;
- 2) assess the current production systems of this species with the aim of advising on adequate control, management and monitoring practices;

- 3) consider appropriate identification and marking systems for specimens in trade and for breeding stocks in captivity in the range States; and
- 4) advise on training and capacity-building needs to manage and control trade in this species.

Most of the Pancake tortoise populations occur in the south eastern Kenya where habitat alteration is a major problem. Efforts are being enhanced towards generation of the best scientific information about the species to elaborate on its conservation management plan including establishment of a system of publicly and /or privately owned nature reserves as a process towards providing for strictly controlled sustainable harvesting from the system to allow for incentives for conservation and management of the species in-situ.

2.1.2. *Species Management Plan & its purpose*

One of the recommendations put forward based on the results of the Non- detriment finding studies was

Through adoption of a decision by the CITES Conference of the Parties,

- a) only specimens of not more than 8cm and from the breeding operations should be allowed into the trade in order to control illegal collection of juveniles of the species from the wild.
- a) considering that Pancake tortoise occupies a very specific type of habitat, the breeding operations should replicate as much as possible the natural habitat of the species
- b) the ratio of hatchlings to adult females in a breeding operation should reflect the known reproduction rate of the species in its natural habitat unless manipulation of conditions in the breeding operations scientifically prove otherwise.

AT NATIONAL LEVEL:

- Efforts should be made to have community programmes planned and initiated to create awareness on Pancake tortoise and threats to the species, promote the importance of the species to the local people and help to counteract the already identified threats to the survival of the species in the non-protected areas.
- Establishment and promotion of Pancake tortoise conservancy areas/sanctuaries/nature reserves that may be private or community based managed as the preferred option to that of breeding in captivity considering the biology of the species. Recommended areas for pilot projects include Voo and Endau in Kitui, Katse in Mwingi and Ciangera in Mbeere districts.

- Research studies should be promoted, guided and supported to generate more scientific information on Pancake tortoise. The research mainly to focus on the species ecology/and or behavior should be highly applied with strong implications for the species conservation and management. Data on population dynamics, social and reproductive behavior, home range size, movement patterns or on reproduction growth and mortality rates should be generated as much as possible as this information is important for Population Viability Analysis, population modeling and to conservation planning.
- Research work to generate Genetic baseline information on Pancake tortoise should be initiated and promoted to help in species identification, individual identity, parent offspring relationship establishment and population identification. Different populations of the same species of animal can be genetically distinct and these differences can be exploited to determine the geographic origin of the individual. DNA samples of Pancake tortoises to be collected through this research will help build the database needed to make DNA typing possible and use it to unravel wildlife crimes involving illegal trade in Pancake tortoise.
- Research and Monitoring programmes should be supported to monitor trends of the natural and introduced populations of Pancake tortoise.
- More and long-term surveys should be supported to determine the population size of Pancake tortoise in the identified distribution areas both in the protected and non-protected.
- More research work should be supported to establish whether a population of the species exists in the inaccessible areas of Bisanadi National Reserve, Garbatula and Shaba hills in Isiolo district that could link the species population in the south with that in the north.
- range States for the Pancake tortoise should initiate and promote joint surveys and monitoring of the species in an effort to determine the species' population status across its entire range and develop common management programmes for the species.

2.1.3. General elements of the Management Plan

Apart from the recommended management measures (see 2.1.2), no specific management plan for the species has been prepared. However, there are procedures for authorizing wildlife captive breeding operations in Kenya and these procedures also apply in regard to the Pancake tortoise.

2.2. Monitoring system

All the authorized wildlife breeding operations are routinely inspected to ensure enforcement and compliance. The breeding operations are required as a matter of procedure to file with the management Authority quarterly returns on the performances of the operations.

2.2.1. *Methods used to monitor harvest*

Except removal of specimens of Pancake tortoise as breeding stock upon authorization of a breeding operation to breed the species, removal from the wild of specimens of Pancake tortoise is prohibited. Upon authorization and licensing of the breeding operations, routine inspections of the breeding facilities are conducted by the Wildlife Authorities

2.2.2. *Confidence in the use of Monitoring*

The MA is responsible for issuance of all authorities and permits for wildlife breeding and trade in accordance with the provisions of the Wildlife Act CAP 376 of Kenya. Authority for establishment of a breeding operation for Pancake tortoise and capture of the initial breeding stock is issued by the Management Authority. The authorization to capture the breeding stock is issued only when the Management Authority is satisfied that the applicant for a breeding operation has put in place appropriate breeding facility that replicates the natural habitat of the species for its success in captivity.

2.3. Legal framework and law enforcement

Hunting and dealership in wildlife and wildlife products have been outlawed in Kenya by an Act of Parliament since 1977 and 1978 respectively. However, Section 67 of the Wildlife Act allows the Minister in charge of wildlife to make regulations for the better management of wildlife farming.

Within the provisions of Section 67 of the Wildlife Act, trade in specimens of Pancake tortoise bred in captivity is allowed. Trade in wild collected specimens of Pancake tortoise is therefore prohibited by law.

3. UTILIZATION OF AND TRADE IN PANCAKE TORTOISE IN KENYA

3.1. Type of utilization

Utilization of Pancake tortoise in Kenya is for international live pet trade mainly to Asia and America. Traded specimens are sourced from authorized breeding operations.

3.2. Harvest

3.2.1. Harvesting regime

Removal from the wild of Pancake tortoise is allowed only for breeding stock in authorized and licensed breeding operations. Consequently, limited number of adult specimens in the ratio 1:3 males and females is collected from the wild.

3.2.2. Harvest Management/Control

International trade is likely to occur at unsustainable levels if there is no adequately functioning mechanism to advise on the matter of detriment, the “non-detriment” finding is incorrect as a result of insufficient information on the species, or export permits are issued contrary to the advice on matter of detriment.

Kenya banned all trade in wild caught specimens of the species in 1981. This saw increased exports of specimens of the species from Tanzania. A moratorium on exports of *M. tornieri* for Tanzania was placed in 1992 pending results of an assessment on significant trade in the species. The assessment followed a seizure of several shipments of the species. The trade assessment found out there was extensive collection of Pancake tortoise in its entire range in Tanzania and that the species had been severely threatened (Klemens & Moll 1995)

Following the moratorium, Tanzania allowed operations to breed specimens of the species for trade. This followed in 1993 establishment of tortoise breeding farms to breed Pancake tortoise among other tortoise species for commercial purposes (Kyalo & Malonza 2001)

In 1995 Kenya licensed establishment of one breeding operation and later in 2005 another both in the known Pancake tortoise range. A third breeding operation but outside the species natural range was established in 1998 to breed the species for trade. The three operations are regulated and monitored by the wildlife authority to ensure compliance.

3.3. Legal and illegal trade levels

Between 1996-2005 the licensed breeding operations have legally exporting using CITES Permits approximately 1,300 live specimens of Pancake tortoise from Kenya.

Despite the moratorium on trade in wild collected specimens of Pancake tortoise and the permit system to control trade in the species, there have been illegal trafficking of specimens of Pancake tortoise for international market. The trafficking has been from both range and non -range States.

Cases of illegal trade in the species have been reported and seizures of live specimens made. Confiscation of a consignment of 209 specimens in Uganda in 2001 and another of 36 from Tanzania in 2007 is a clear indication that there is demand for specimens of the species in the international market.

The aims of the Convention on International Trade in Endangered Species of wild Fauna and Flora –CITES are to protect species from the detrimental effects of over exploitation for international trade and ensure sustainable utilization of others. Determining when international trade is likely to prove non -detrimental to the survival of the species is essential.

Inadequate application of stricter measures to control the trade especially exports of Pancake tortoise specimens from the breeding operations across the species range can easily render efforts to control illegal trade in specimens of the species from the wild futile.

II. NON-DETRIMENT FINDING PROCEDURE (NDFs)

1. IS THE METHODOLOGY USED BASED ON THE IUCN CHECKLIST FOR NDFs?

X yes _no

Methodology used in doing NDF studies on Pancake tortoise has been basically undertaking of a national survey in 2001-2002 to establish the species population distribution and status using the IUCN checklist for NDFs. The checklist was extensively referred to during the process.

2. CRITERIA, PARAMETERS AND INDICATORS USED

The concepts in the checklist were referred to when carrying out the NDF process and applied in combination with information on the following elements:

The species characteristics:

- Distribution
- Tolerance to human disturbance such as habitat alteration and conversion into agriculture and destruction of the habitat as a result of rock ballast harvesting
- Ease with which to breed in captivity
- Species habitat requirements

3. MAIN SOURCES OF DATA

The following are the sources of data for making NDF on Pancake tortoise in Kenya

- Field assessment of population abundance. Regular assessments of the identified and mapped fragmented populations as established during the national survey in 2001-2002
- Applications to breed and for exports of live specimens by the breeding operations
- Authorities to capture breeding stocks and the returns filed by the breeders with Kenya Wildlife Service
- Export permits issued for export of live specimens of Pancake tortoise
- Reporting by the breeding operations on the performance of the facilities and physical inspections of the breeding facilities by the Wildlife Authorities to assess the levels of production
- Routine inspection of the breeding operations by the Management and Scientific authorities.

4. EVALUATION OF DATA QUANTITY AND QUALITY FOR THE ASSESSMENT

Data generated from detailed reporting by the breeding operations on levels of successful recruitment in the breeding operations against the number of specimens approved for removal from the wild as breeding stocks is evaluated and analyzed to provide information on the species population dynamics. The information is also used to monitor compliance.

5. MAIN PROBLEMS, CHALLENGES OR DIFFICULTIES ON ELABORATION OF NDF

Major challenge in the elaboration of NDF studies on the Pancake tortoise has been to get the definite population size of the species considering its biology, behavior, habitat characteristics and remoteness of its distribution range.

6. RECOMMENDATIONS

The use of the IUCN Checklist for NDF is quite applicable to the Pancake tortoise species. The checklist is therefore a practical tool for making NDF on the species however, it is important that quantitative data on the species is generated to provide informed assessment of the status of the species especially where the checklist calls for qualitative information and also assist in making decision on possible alternative management system such as allowing limited off-take from the wild especially as incentives to communities supporting the in-situ conservation of the species by foregoing other land use systems. Efforts must therefore be made to generate the quantitative information as much as possible. Such elements that need this quantitative data include the biological status to inform on the approximate population size, structure, sex ratio and nesting ecology.