Proceedings of the First Tanzania Small Carnivore Conservation Action Plan Workshop

Tanzania Wildlife Research Institute (TAWIRI)

19th-21st April 2006, Tanzania Carnivore Unit, TAWIRI, Arusha, Tanzania





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edited by Durant, SM, Lobora, A, Pettorelli, N

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1. Agenda

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8.45-8.50	Official opening	Simon Mduma
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9.00-9.30	Meeting background	Sarah Durant
9.30-9.45	Agreement on the agenda	Facilitator
9.45-10.30	Background on small to medium carnivores conservation	Noah Mpunga
10.30-10.35	Group photograph	All
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11.00-11.15	Individual species distribution and abundance	Alex Lobora
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	DAY III	
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3:30-4:00	**Tea break**	All
4:00-4:30	Medium carnivores cont.	
4:30-5:00	Summing up and closure	Facilitator

3. INTRODUCTION

The First Tanzanian Small Carnivore Conservation Action Plan Workshop was held 19th-21st April 2006 in the meeting room in the Tanzania Carnivore Unit, at the Tanzania Wildlife Research Institute (TAWIRI) headquarters in Arusha. The workshop brought together stakeholders to assess existing information and set priorities for the conservation of 28 species of small to medium carnivores in Tanzania. These are 3 species of small to medium sized felids or cats: serval (*felis serval*); caracal (*felis caracal*) and wild cat (*felis sylvestris*). A total of 5 mustelids, including two species of otter: Cape clawless otter (*Aonyx capensis*) and spotted necked otter (*Lutra maculicollis*); one badger, the honey badger or ratel (*Mellivora capensis*); and two species of weasel or polecat: striped weasel (*Poecilogale albinucha*) and zorilla (*Ictonyx striatus*). Four species of canid: bat eared fox (*Otocyon megalotis*); black-backed jackal (*Canis mesomelas*); golden jackal (*Canis aureus*); side-striped jackal (*canis adustus*). Six species of viverrids including the genets and civets: common genet (*Genetta genetta*); large spotted genet (*Genetta maculata*); miombo genet (*Genetta angolensis*); servaline genet (*Genetta servalina*); one civet, the African civet (*Viverra civetta*); one palm civet, the two-spotted palm civet (*Nandinia binotata*). Finally, there are ten species of mongoose or herpestidae: bushy tailed mongoose (*Bdeogale crassicauda*); Egyptian mongoose (*Herpestes ichneumon*); banded mongoose (*Mungos mungo*); dwarf mongoose (*Helogale parvula*); marsh mongoose (*Atilax palutinosus*); Mellers mongoose (*Rhynocholgale melleri*); slender mongoose (*Herpestes sanguineus*); sokoike dog mongoose (*Bdeogale omnivora*); Jackson's dog mongoose (*Bdeogale jacksonii*) and white-tailed mongoose (*Ichneumia albicauda*). Four further species were named as bordering the country and hence might have populations in Tanzania, but there is no evidence for this as yet. These are the golden cat (*felis aurata*); the congo clawless otter (*aonyx congica*); the long snouted mongoose (*Herpestes naso*); desert dwarf mongoose (*Helogale hirtula*). Two of these species are classified as threatened by IUCN, the Jackson's dog mongoose and the Sokoike dog mongoose. However there is very little information on most of species. The workshop was attended by 16 participants from TAWIRI, Wildlife Division (WD), Tanzania National Parks (TANAPA), Ngorongoro Conservation Area Authority (NCAA), Forestry and Beekeeping Division (FBD) together with experts from WCS's southern highlands project.

TAWIRI, through the Tanzania Carnivore Monitoring Project, has been collecting information on all carnivores in Tanzania including those listed here since 2002. Despite this effort, information on all small to medium carnivore species in the country is still limited, making it difficult to plan for the conservation of these species. This workshop aims to document what we currently know about the status of these species and their conservation across the country and to set priorities for future research and conservation. These proceedings form a draft chapter for the small and medium carnivore section in the National Carnivore Conservation Action Plan.

Fig. 1 Participants at the meeting, from back and starting from left. Back row: Novatus Magoma, Lara Foley, Noah Mpunga. Middle row: Rehema Tibyenda, Pauline M. Mpuya, Sarah Durant, Charles Foley, Simon Mduma, Linus Minushi. Front row: Julius Keyyu, Alex Lobora, Mwemezi Rwiza, Edwin Konzo, Midala.

3.1 Presentations

3.1.1. Behavioural Ecology and conservation

Abstract of presentation by Noah to be added

4. Distribution and abundance

The Tanzania Carnivore Project has been collecting information on the distribution of all species of carnivore across the country since 2002 through its Carnivore Atlas project. Of the 28 species judged to be resident and hence covered in this report, there is at least one reliable recent record for all species. The majority of the information contributed to the atlas project is from the northern sector, principally due to the better infrastructure and higher number of visitors in the region; whereas, data from the south, west and central regions are limited.

The group agreed on the following regions as the basis for regional analysis:

Northern region - Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi
Maasai steppe - Tarangire, Manyara, Simanjiro, Mkungunero
North west and central region - Ugalla, Mahale, Minziro, Bukoba, Rubondo, Singida, Dodoma, Tabora, Moyowosi/Kigosi
Rukwa-Lukwati - includes Katavi, Ruaha, Rungwa, Lwafi
Selous-Niassa - includes Mikumi, Lindi
Coast - includes Mtwara, Zanzibar and Saadani
Southern highlands - includes Mbeya, Rungwe, Kitulo, Mpanga/Kipengere
Eastern arc mountains - includes Usambaras, Uluguru, Udzungwa
Northern – Serengeti/Ngorongoro
Maasai Steppe –Tarangire and West Kili/Mkomazi/Arusha; Natron
Central/Western – Ruaha complex; Katavi/Rukwa/Ugalla/Mahale complex; Moyowosi/Kigosi
Southern – Selous/Mikumi; Selous-Niassa corridor and coastal districts
North west – Ibanda/Burigi/Kagera/Buramulo

These regions are more detailed than in the other carnivore reports within the national Carnivore Conservation Action Plan, reflecting a higher habitat and area specifity for several of the species in this report. The group went on to explore and summarise the evidence for species distribution within each of these regions.

4.1 The serval: Summary of current knowledge

Scientific name: *Felis serval*
Other names in use in Tanzania: Serval (English), Mondo (Kiswahili)
CITES: Appendix II. 2006 Tanzania quota: 160 live animals.
IUCN Red list: least concern (2001), with an overall downward trend.

Fig. 2. Serval

Physical description.

The serval (*Felis serval*) is a medium sized cat, a pale sandy colour, with bold elongated black spots that tend to merge into longitudinal stripes on the back and legs. Black morphs are not uncommon in Tanzania. The coat can also have a small spotted pattern, not dissimilar to that of a cheetah, but this pattern has not been recorded in Tanzania. The tail is relatively short, compared to the other two spotted cats in east Africa, leopards and cheetahs, and the species is substantially smaller. The legs are relatively long. The ears are very prominent, and have characteristic markings on their back, being decorated by bold large white spots in a black background. The species has a head and body length of 67-100cm and a tail length of 24-35cm. Males are slightly heavier than females, weighing 13kg (range 10-18kg) compared to an average of 11kg (range 8.7-12.5kg) for females (Kingdon 1977). Whilst a number of different subspecies have been described, partly because of the wide variation in coat pattern, the current thinking is that all servals in subsaharan Africa are one subspecies: *F. s. serval* (Nowell & Jackson 1996; Skinner & Smithers 1990). They have five digits on the front feet, however the fifth digit is a dew claw and is set far back from the main digits and does not mark the spoor. The hind feet have 4 digits. The claws are retractable and do not appear on spoor unless in slippery ground. The dental formula is 3/3-1/1-3/2-1/1=30.

Ecology

Servals are found in savannah habitat, but are also common in subalpine habitats including bamboo and forest, as long as they include grassy glades or moorland. At lower altitudes they can be found along margins of forests and in reedbeds and marshes (Kingdon 1977). They can also be found in farmland (Msuha pers. comm.), and hence are potentially able to adapt to changing land use patterns from pastoral to agricultural land. Their diet includes a wide range of small mammals, birds, reptiles, and insects (particularly termites and grasshoppers). Hares and rodents are the commonest foods, those recorded are: murid species *Mastomys, Arvicanthis, Lemniscomys, Dasymys*; mole rates, *Tachyoryctes* and *Cryptomys*; ground squirrels, *Xerus erythropus*; and cane rats, *Thryonomys*. Birds recorded as prey are: Quails, *Coturnix*; spurfowl, *Ptermistes*; guineafowls, *Numidia*; and bustards, *Otidae*. They sometimes cache food. They have also been recorded eating other carnivores such as dwarf mongoose (Durant pers. obs.) and vegetables and fruits (Kingdon 1977).

Geertsema's study of servals in Ngorongoro crater in the 1970s remains the most detailed study of serval ecology to date (Geertsema 1985). Of the prey species she recorded, larger rodents are preferred; in Ngorongoro crater, the main species taken were swamp and Nile rats, and frogs (Geertsema 1985). Prey are located by sight and hearing using the species well developed ears. Once located, rodents are caught by jumping on to them on the ground, large prey are stalked by eye to as close as possible followed by a short rush – chases are usually much less than 100m, and birds are caught using an often spectacular leap where the bird is grapped from the air by the front claws, or a short charge on the ground. In the crater servals were largely crepuscular (Geertsema 1976, 1985), however both diurnal and nocturnal species are represented in the diet elsewhere, suggesting that in some areas they may be nocturnal (Kingdon 1977, van Aarde & Skinner 1986), but this may be due to human disturbance (Bowland 1990).

The species is solitary and thought to be territorial. Females and males may differ in terms of faecal marking, as in captivity females tend to mark the same place, whilst males exhibit a more random pattern (Kingdon 1977). There is very little known about wild servals, however the most thorough study conducted to date was of individually recognised servals conducted in Ngorongoro crater in the 1970s (Geertsema 1976, 1985). Territory size was calculated for one male, that had a range of at least 11.6km^2, and overlapped with the ranges of at least two females (Geertsema 1976, 1985). Home ranges in southern Africa have been recorded as substantially smaller at between 2-3km^2 for 2 male servals (van Aarde & Skinner 1986) and substantially larger at 15-30km^2 (Bowland 1990).

Mortality and reproduction

Servals give birth to 2-3 young in a well hidden lair in dense vegetation, a hollow tree or down a hole (Kingdon 1977). The maximum litter size has been variously noted as 5 (Kingdon 1977); 4 (Wackernagel 1968) and 3 (Skinner & Smithers 1990). Out of 20 litters in captivity, litter size averaged 2.35 cubs (Wackernagel 1968). Gestation is 73 days (Nowell & Jackson 1996). In Uganda and eastern DRC there appear to be two birth seasons which coincide with the wet seasons, in March-April and again September-November (Kingdon 1977), however in Ngorongoro crater the birth season appears to be in the mid to late dry season, probably so that the rains coincide with the period when the cubs are older but still dependent, and hence require more provisioning (Geertsema 1985). Cubs are blind and helpless when born. They have been recorded as reaching 19 years in captivity (Nowak 2005). Cubs are independent at around 6-8 months, and may stay within their natal range for up to and over their first year (Geertsema 1985). Age at sexual maturity in captivity is 18-24 months (Nowell & Jackson 1996).

There is little known about causes of mortality. Servals are probably subject to most feline diseases, but there is little information. Leopards and cheetah have been seen to pursue servals (Kingdon 1977; Durant pers. obs), although there are no records of deaths in this way. Domestic dogs may also chase and kill servals. The skin of the species can sometimes be sold as a young leopard making the species vulnerable to a resumption in the fur trade.

Distribution and habitat

The serval's broad habitat preference means it has a widespread distribution across sub-Saharan Africa, and is thought to occur across the sahelian belt south of the Sahara, and through east Africa and southern Africa. It is excluded only from the central and west African forests, and the deserts of southern Africa, north Africa and the horn of Africa. Proximity to water is thought to be essential, together with adequate cover, presumably for hunting and lying up during rest periods (van Aarde & Skinner 1986). Whilst the species used to occur north of the Sahara, there are only a few relict populations in the Atlas Mountains and northern Tunisia (Nowell & Jackson 1996). It is thought to have a widespread distribution in Tanzania (Kingdon 1977; Skinner & Smithers 1990).

Distribution

Northern region - Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi

Widespread in Serengeti and Ngorongoro conservation area. No records from Maswa, Grumeti and Ikorongo Game reserves, although probably present. Records in LGCA immediately to east of Serengeti National Park and north of Ngorongoro Conservation Area, and to east and west of lake Natron. There are records from Kilimanjaro national Park from a camera trapping survey in 2004-5, where a total of 42 were trapped in the forest over 1001 days, including 9 sightings of melanistic servals. In a recent camera trap survey in Arusha National Park no servals were trapped, over ??? days. There are no recent records from Mkomazi, however the species has been recorded there historically (Eltringham et al. – undated).

Maasai steppe - Tarangire, Manyara, Simanjiro, Mkungunero.

There are records from Manyara national park and from Tarangire national park including 3 sightings from a camera trap survey in northern Tarangire over 1169 days in 2004-5. A more recent camera trap survey towards the centre of the park had a higher number of sightings. There are few records from outside the protected areas, but the species has been observed to the east of Tarangire, and just south of Moshi, There are no records from Mkungunero game reserve, although the habitat should be suitable for the species.

North west and central region - Ugalla, Mahale, Minziro, Bukoba, Rubondo, Singida, Dodoma, Tabora, Moyowosi/Kigosi.

There are few records from this region. There is one sighting in Moyowosi game reserve, and there are camera trap sightings (1 photograph out of 653 camera trap days) in a survey by TAWIRI in Mahale National Park. There are no recent records from Tabora, Bukoba, Rubondo, Singida, Dodoma, Singida, Kigosi Game Reserve or from Mnziro forest reserve, despite a recent camera trap survey in the region covering over 1,500 camera trap days. Historically, the species

has been hunted and/or sighted in Ugalla and Burigi Game Reserves (Caro et al. 1998b; Thomas 1962) and there is a record of a serval to the east of lake Victoria, just south of Minziro Forest.

Rukwa-Lukwati - includes Katavi, Ruaha, Rungwa, Lwafi

There are records of serval on the edges of Katavi national Park, Rukwa Game reserve, Muhesi Game Reserve, including one on the border of Kisigo game reserve. However there are no recent records from Rungwe Game Reserve, Ruaha National Park, Usungu Game Reserve, Lukwati Game researve, or Lwafi. The southern highlands project report serval as relatively common around Rukwa game reserve.

Selous-Niassa - includes Mikumi, Lindi

There are records of serval from the northern part of the Selous Game Reserve, however there are no records from Mikumi National Park or Lukwika or Mahjesi Game Reserves nor in the entire Selous/Niassa corridor. There is a record reported from a game district warden just north of Lindi and one record just east of the northern section of the Selous, again reported by a game district warden. There is a sighting record from the Kilombero valley (Starkey 1997) and Kingdon (1977) reports several sightings in the Niassa corridor.

Coast - includes Mtwara, Zanzibar and Saadani

There are no records from this region.

Southern highlands - includes Mbeya, Rungwe, Kitulo, Mpanga/Kipengere

There are no records of the species across this region from the Carnivore atlas, however the southern highlands project report serval as present in the mount Rungwe and the Livingston mountains areas and report them as being present but uncommon in the Mbeya region and present around south Tanganyikia. Kingdon (1977) reports several serval records west, south and south east of lake Rukwa,

Eastern arc mountains - includes Usambaras, Uluguru, Udzungwa

There are records of serval in the Udzungwa Mountains National Park from camera trapping studies by Francesco Rovario and the southern highlands project. The southern highlands project record servals as being present around Iringa and Morogoro. There are no records of serval in other areas.

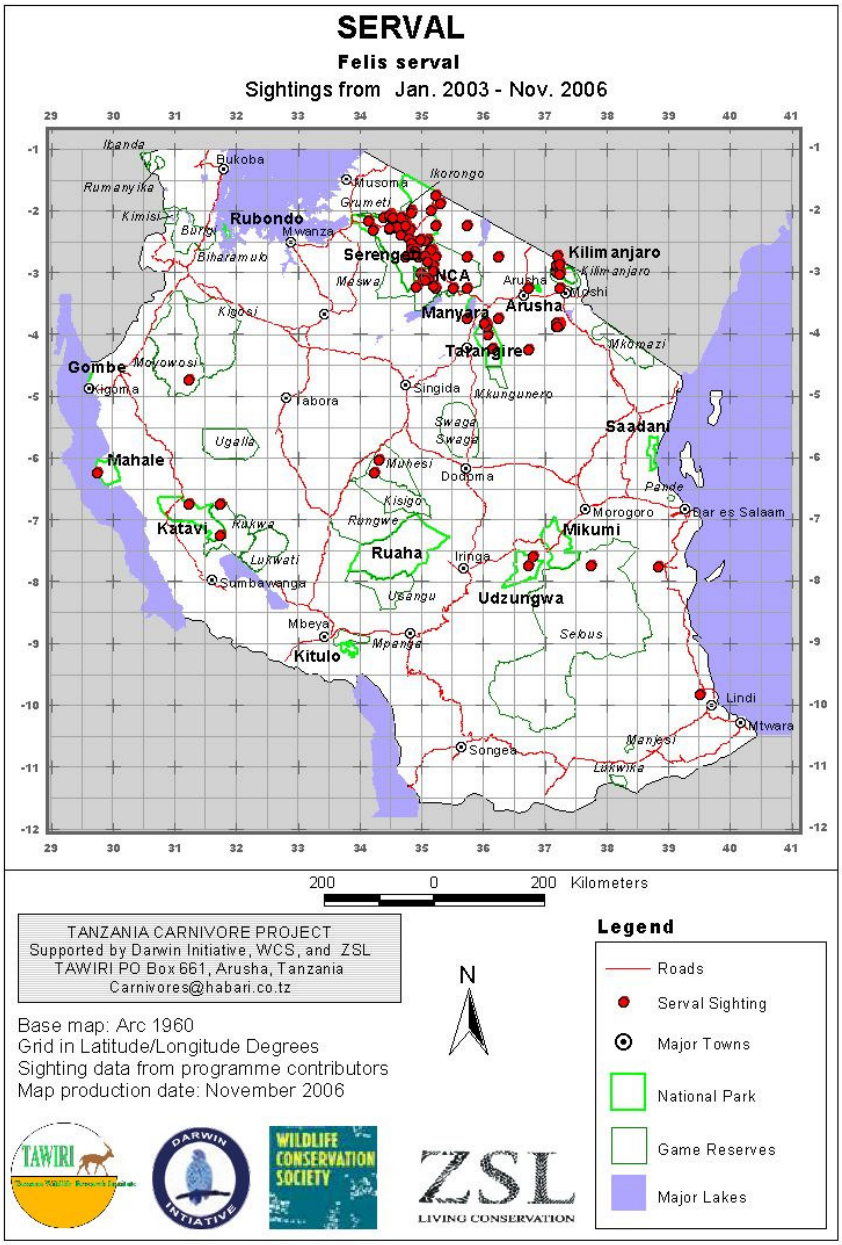

Fig. 3 Map of known sightings of servals submitted to the Tanzania Carnivore Project since 2002 up until the time of the workshop. Data submitted are in two forms, either as direct GPS locations, or as a grid square as identified on the map. The former data type are plotted on the map directly, whilst the latter data type are plotted at the centre of the reported grid square.

4.2 Caracal: Summary of current knowledge.

Scientific name: *Felis caracal*
Other names in use in Tanzania: Caracal (English), Simbamangu (Kiswahili)
CITES: African population Appendix II (Asian population appendix I), no quota listed for Tanzania.
IUCN Red list: Least concern but the population is in decline

Fig. 4. A caracal family.

Physical description

Caracals are generally uniformly coloured a tawny brown to brick red, although black individuals have been recorded (Nowell & Jackson 1996). They are tall with relatively short legs, a broad head, short tail and very distinctive ears which are topped with black tufts about 4.5 cm in length, which distinguishes the species from the golden cat. The ears have long white hairs within and are black behind, and both the rims and their bases have crisp black margins which make the ears stand out against their background (Kingdon 1977). The face is very distinctive, with white on the chin and throat, and a black line from the eye to the nose. They are the largest of the small cats, with a head and body length of 76(60-91.5)cm and tail of 23-31cm (Kingdon 1977). Females are lighter than males, with males and females weighing 13(7.2-19)kg and 10(7-15.9)kg respectively in southern Africa (Skinner & Smithers 1990). The feet have four digits and one dew claw, which does not show in spoor, on the fore feet, and four digits on the hind feet. The claws are fully retractable and do not show on spoor except on wet ground, when they might be extended to grip. Vocalisations include miaows, growls, hisses and coughing calls (Kingdon 1977). There are 2 subspecies in sub Saharan Africa, with F. c. caracal resident in Tanzania. The dental formula is 3/3-1/1-2/2=24 or 3/3-1/1-3/2-1/1=30 (Skinner & Smithers 1990).

Ecology

The carcacal prefers dry country – woodland, savannah and scrub. It is found in stony deserts, but it avoids sandy deserts. According to studies in southern Africa, caracals take a variety of prey, ranging from rodents, hares and hyrax to small antelope (Nowell & Jackson 1996), occasionally as large as adult springbok and young kudu (Nowell & Jackson 1996). The species is known for its ability to catch birds, leaping high into the air to knock them down with their paws after they are flushed out from the ground. They have also been recorded as taking invertebrates and reptiles. The mammalian prey list includes dik-dik, duiker, hyraxes, hares, various rodents and monkeys (Kingdon 1977). Mean daily food intake for captive animals has been estimated as 500g for males and 316g for females (Moolman 1986). There is little published data on caracal from Tanzania, however in the Serengeti they have been recorded as taking storks (Barrett pers. comm.). Caracals have rarely been recorded to take carrion, however they have been recorded as scavenging from cheetah, although only after the cheetah voluntarily left the carcass, and they can be attracted to traps provided bait is relatively fresh. Caracal have been recorded as caching kills in trees, as with leopards, however this behaviour is thought to be uncommon (Nowell & Jackson 1996). The species is predominantly nocturnal but is often observed in the day time, particularly in protected areas (Nowell & Jackson 1996).

In south Africa home ranges of males were recorded as 5.1-48km^2, with marked overlap, whilst female home ranges were 3.9-26.7km^2 but with very slight overlap (Skinner & Smithers 1990).

Substantially larger home ranges have been reported in the Negev of Israel, averaging 221km^2 for males and 57km^2 for females, with male ranges encompassing several female ranges (Nowell & Jackson 1996). The species is solitary, although there are occasionnal observations of groups with more than one adult, and is thought to be territorial.

Reproduction and mortality

There is little known about the reproduction and mortality of caracals, and what data there is comes from southern Africa. They are thought to breed all year round with an oestrus of 1-3 days and a cycle of 14 days (Nowell & Jackson 1996). Gestation is 78-81 days and litter size in captivity averages 2.2 kittens, ranging between 1-4 (Nowell & Jackson 1996). In the wild the maximum litter size reported differs between three (Nowell & Jackson 1996) and six kittens (Kingdon 1977). Kittens are born in a secure shelter, a cave, a hollow tree or down and aarvark's burrow (Kingdon 1977). The males are able to breed from 12.5-15 months and the females from 14-16 months in captivity, and they are thought to be able to produce around one litter annually. They have been recorded as living up to 19 years in captivity, with an age of last reproduction of 18 years. There is little information on mortality, although they have been recorded as being killed by lions (Pienaar 1969) and they are persecuted in southern Africa. The fur has been reported as having no commercial value (Kingdon 1977), although elsewhere there are reports of the species being trapped for its skin (Nowell & Jackson 1996).

Distribution

Caracals inhabit drier savannah and woodland areas in sub-saharan Africa, with a strong preference for more scrubby arid habitats. They do not occur in the central and west African tropical rain forest belt, but have been recorded in montane forests. In Tanzania their published distribution covers much of the country, except the northwest, appearing to be excluded from a line north west of katavi, singida, and Kilimanjaro (Nowell & Jackson 1996).

Northern region - Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi

There are records of the species from south and north Serengeti National Park, and from the border of the Ikorongo and Grumeti Game Reserves. There are also records from the west of Ngorongoro Conservation Area, and outside the protected area system to the east of the park, west and southeast of Lake Natron. The species is not recorded in Maswa Game Reserve, although it is likely to be present as the habitat is suitable. There are no recent records of the species from Kilimanjaro area or Mount Meru but the species has been recorded in Mkomazi National Park. There are published observations around Kilimanjaro (Child 1965; Grimshaw et al. 1995), some of which are fairly recent, and hence the species is likely to be present in this area.

Maasai steppe - Tarangire, Manyara, Simanjiro, Mkungunero.

There are records from Manyara National Park and from Tarangire national park. There are few records from outside the protected area in Simanjiro – one to the east of Tarangire, and a couple just south of Moshi. There are no records from Mkungunero Game Reserve. There are older records which, although few, are widespread across these region (Kingdon 1977).

North west and central region - Ugalla, Mahale, Minziro, Bukoba, Rubondo, Singida, Dodoma, Tabora, Moyowosi/Kigosi.

There are no records from this region, despite camera trap surveys in Mahale National Park (653 camera trap days) and Mnziro forest reserve (>1,500 camera trap days).

Rukwa-Lukwati - includes Katavi, Ruaha, Rungwa, Lwafi

There are records of caracal from Katavi and Ruaha National Parks. However there are no records from elsewhere in this region, except for a few historical records close to the southern shore of Lake Rukwa (Kingdon 1977; Vesy-FitzGerald 1964).

Selous-Niassa - includes Mikumi, Lindi

There are no recent or known historical records of the species from this region, it is probably not present.

Coast - includes Mtwara, Zanzibar and Saadani

There are no records of the species from this region.

Southern highlands - includes Mbeya, Rungwe, Kitulo, Mpanga/Kipengere

There are no recent or historical records of the species from this region.
Eastern Arc Mountains - includes Usambaras, Uluguru, Udzungwa
There are camera trap records of caracal in the Udzungwa Mountains National Park, but there are no records from the carnivore atlas project of the species elsewhere in this region. The southern highlands project report caracal as present around Iringa, but note that it is uncommon.

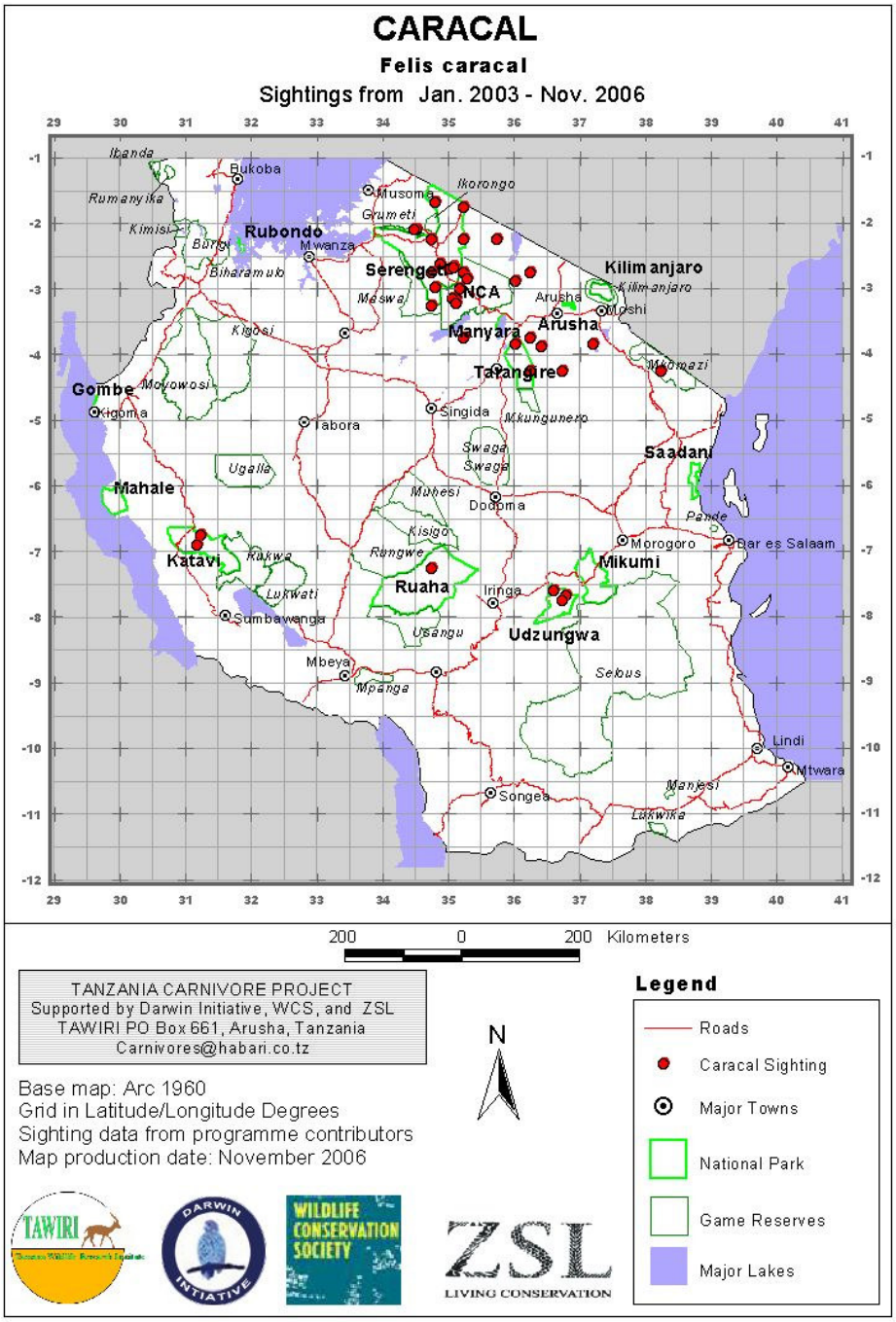

Fig. 5 Map of known sightings of Caracal submitted to the Tanzania Carnivore Project since 2002 up until the time of the workshop. Data submitted are in two forms, either as direct GPS locations, or as a grid square as identified on the map. The former data type are plotted on the map directly, whilst the latter data type are plotted at the centre of the reported grid square.

4.3 African Wildcat: Summary of current knowledge

Scientific name: *Felis silvestris*
Other names in use in Tanzania: Wild cat (English), Pakamwitu (Kiswahili)
CITES: African population Appendix II. 2006 Tanzania quota: 100 live cats.
IUCN Red list: Least concern but the population is in decline

Fig. 6 Wild cat hunting.

Physical description.
The African wildcat is the common name for the subspecies lybica within Felis silvestris. The species is very similar in size and appearance to the domestic cat, and the two can be difficult to distinguish in the field. The background colour of the coat ranges from reddish to sandy yellow to tawny brown to grey and is typically marked with faint tabby stripes and spots. The tail has several dark bands and a blackish tip. There is wide variation in colour, but pale forms tend to live in drier zones and darker forms in more humid areas (Kingdon 1977). There is supposed to be a reddish or rusty brown tint to the backs of the ears for the group and the pure strain has longer legs than the domestic cat (Nowell & Jackson 1996). Head and body length is 55(47-66)cm and tail length is 34(20-38)cm. Males are slightly heavier than females weighing an average of 5(3.7-6.5)kg compared with 4.3(3-5.5)kg. The dental formula is 3/3-1/1-3/2-1/1=30. As with the other small cats, the wild cat has 5 digits on the front feet and 4 on the hind feet, however the 1st digit on the fore feet is set back and does not show in spoor, whilst all claws are fully retractable and only show on slippery ground when they might be extended to prevent slipping.

Ecology
Wild cats live in virtually all habitats, from desert and savannah to swamp and forest. They are primarily nocturnal, but are also active in the early morning and late afternoon. In southern Africa, where the species has been most studied, the main prey species are rodents. A variety of birds reptiles and amphibians are also taken, as well as other mammals, including young antelope. Insects and arachnids, including solifuges and scorpions are also frequently taken, but they seldom scavenge carrion (Nowell & Jackson 1996). The species is solitary, although it's descendent, the domestic cat can be social. It is probably territorial, although there is little data to confirm this.

Mortality and reproduction
The species appears to have a distinct birth season in southern Africa, which has been recorded as Sep-March in southern Africa (Skinner and Smitthers 1990) and January to March in the northern Sahara (Dragesco-Joffe 1993). There is little data from east Africa, although Kingdon (1977) notes that breeding may take place throughout the year, but is likely to peak in the wet season. Gestation in captivity has been recorded as 56-63 days (Green 1991) and litter size in captivity ranges from 1-5. A single study in the wild estimates litter size as 3.4 with a range of 2-5 out of 7 females in Botswana (Nowell & Jackson 1996). Kittens are born in a lair in a hollow tree, hole, rock crevice or under heavy cover (Kingdon 1977). They are born blind, open their eyes at 1-14 days, and are mobile and active at one month, and accompany their mother when she is hunting before three months of age (Kingdon 1977). The family will break up when the kittens reach six months, and they become sexually mature soon after one year old.

Longevity has been recorded as up to 15 years in captivity (Nowell & Jackson 1996). There is virtually no data on mortality, however wild cats are probably susceptible to all the diseases affecting domestic cats. They have been recorded as being killed by pythons, and can be killed by dogs or shot in retaliation for poultry depredation (Kingdon 1977).

Distribution and habitat

The species occurs across a variety of habitats ranging from desert to forest, and has been recorded at over 3,000m (Kingdon 1977), and is reported to only be absent from tropical rain forest. Density is likely to vary widely with prey availability as is common with other small cat species. In Israel a density of 1/km^2 was estimated in open oak forest on hilly and rocky ground (Nowell & Jackson 1996), elsewhere estimates in optimal conditions are thought to be 0.3-0.5/km^2 (Nowak 2005). In east Africa, the home range of a single male wild cat was estimated as 4.3km^2 near Nakuru, Kenya (Nowell & Jackson 1996). Densities in the Serengeti National Park have been estimated at between 0.1-1.0/km^2 (Waser 1980). It is probably the most abundant felid species; however it is threatened by hybridisation with domestic cats leading to an increasing rarity of pure wild cats.

Previous maps of distribution in Tanzania suggest the species should be widespread across Tanzania (Nowell & Jackson 1996). However it is likely that areas around urban centres, or villages, are likely to be occupied with domestic wild cat hybrids, and not pure wild cats. Pure strains of wild cat are now likely to be found only in protected areas remote from humans (Nowell & Jackson 1996), however they are not always easy to distinguish from domestic cats.

Northern region - Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi

There are numerous records of the species from south and central Serengeti National Park, but no records from the western corridor or from the north. There are also no records from Ikorongo, Grumeti and Maswa game reserves. There are few, but widespread, records from Ngorongoro Conservation Area, and outside the Serengeti protected area system to the east of the park, west and southeast of Lake Natron. The species has been recorded to the west of Kilimanjaro and north of Arusha, but there are no records from Arusha National Park, despite an extensive camera trap survey. There are no records of the species in Mkomazi Game reserve, although there are historical records from this area in the literature (Eltringham et al. undated).

Maasai steppe - Tarangire, Manyara, Simanjiro, Mkungunero.

There are records from Manyara and Tarangire National Parks, including camera trap survey records for the latter. Outside these protected areas there is limited information, except for a record south of Lake Eyasi, and a couple of records to the northeast and east of Tarangire National Park. There are no records of the species from Mkungunero Game Reserve.

North west and central region - Ugalla, Mahale, Minziro, Bukoba, Rubondo, Singida, Dodoma, Tabora, Moyowosi/Kigosi.

There is a single record from Mahale Mountains National Park but no records from Ugalla, Moyowosi and Kigosi Game Reserves. Outside the protected areas, there is a single record east of Dodoma, but there are no further records across the region, stretching from Bukoba to Singida. The species was not recorded in Minziro Forest Reserve despite an extensive camera trapping survey in 2006.

Rukwa-Lukwati - includes Katavi, Ruaha, Rungwa, Lwafi

There are records of wild cat on the north east boundary of Katavi National Park, but there are no records elsewhere in the region, including Rukwa, Lukwati, Usangu, Rungwe, Muhesi or Kisigo Game Reserves nor in Ruaha National Park. There is a historical observation from the Rukwa Valley (Vesey-FitzGerald 1964).

Selous-Niassa - includes Mikumi, Lindi

There are records of wild cat from the northern part of the Selous Game Reserve, however there are no records from Mikumi National Park or Lukwika or Mahjesi Game Reserves nor in the entire Selous/Niassa corridor.

Coast - includes Mtwara, Zanzibar and Saadani

There are no records from this region.

Southern highlands - includes Mbeya, Rungwe, Kitulo, Mpanga/Kipengere

There are no records of the species across this region.

Eastern Arc Mountains - includes Usambaras, Uluguru, Udzungwa

There are records of the species from the north of Udzungwa Mountains National Park and in the vicinity of Iringa. The southern highlands project report the species to be present around Iringa and the north Udzungwas, although uncommon but possibly widespread.

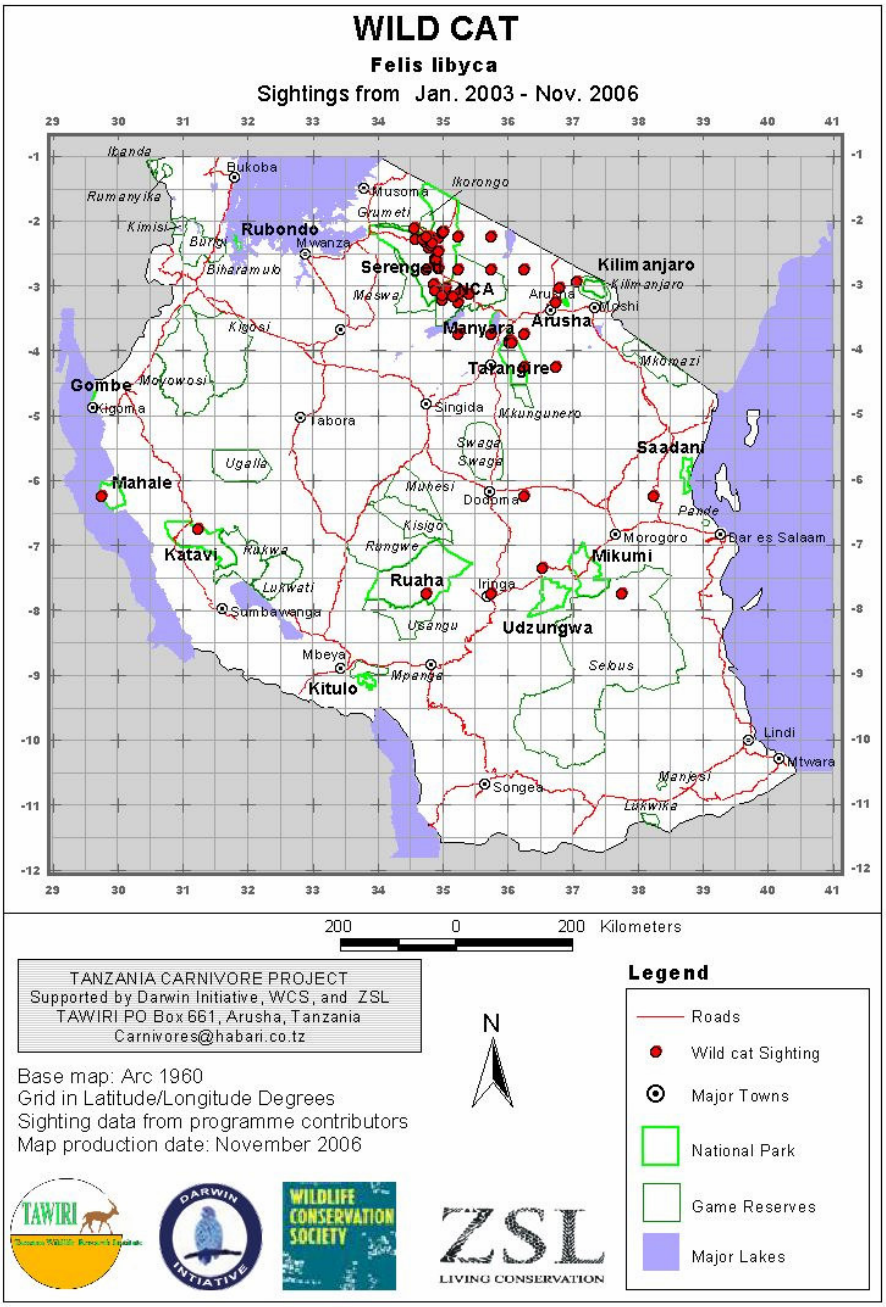

Fig. 7. Map of known sightings of wild cat submitted to the Tanzania Carnivore Project since 2002 up until the time of the workshop. Data submitted are in two forms, either as direct GPS locations, or as a grid square as identified on the map. The former data type are plotted on the map directly, whilst the latter data type are plotted at the centre of the reported grid square.

4.4 Spotted Necked otter: Summary of current knowledge

Scientific name: *Lutra maculicollis*
Other names in use in Tanzania: Spotted necked or spot necked otter (English), Fisi maji (Kiswahili).
CITES: Appendix II, Tanzania has a 2006 quota of 100.
IUCN Red list: Least concern (2004), Vulnerable (1999), but the population is currently thought to be stable.

Fig. 8. Spotted necked otter.

Physical description.
This otter is usually dark brown with spots and streaks of paler colour on the throat and underside of the neck and belly. The paws are webbed with claws, but the teeth are small and specialised for catching fish rather than crustaceans as with the other African otters (Foster-Turley et al. 1990). It is slimmer and has a longer tail than the clawless otters. Head and body length is 46-76cm, tail is 40 (30-51)cm. Males are slightly heavier than females, weighing 5(3.5-9)kg on average compared with 4(3-5)kg for females (Kingdon 1977). There are five digits on both hind and fore feet, which are clearly marked in spoor.

There are two subspecies listed for Tanzania L. M. nilotica around Lake Victoria, and L. M. chobiensis in southwest Tanzania. It has a variety of vocalisations, including a throaty whistle, common amongst otter species, a short 'yang', a loud harsh mewing call, a bird like chattering that can rise to a trilling noise and a gasping noise which can become a spluttering snort (Kingdon 1977). The latter is used to express alarm. The dental formula is 3/3-1/1-4/3-1/2=36.

Ecology
The species depends on fish and hence prefers larger rivers, lakes, swamps and wetlands than the clawless otters. It has not been recorded in sea water. Haplochromis was thought to be the most important food fish in Lake Victoria (Proctor 1963). They usually hunt fish of 10-20cm in length, but have been recorded killing fish up to 60cm (Kingdon 1977). Fish species, other than Haplochromis, found in their diet include Bagrus, Barbus, Clarias, Protopterus and Tilapia, as well as molluscs, frogs, crabs, waterfowl and other birds, their nestlings and eggs, mice and aquatic insects and their larvae (Kingdon 1977). They mainly hunt by sight and hence need clear unpolluted water with numerous small fish, crabs and frogs. Long reeds, grass and bushes are essential to provide cover, and holes or other shelters are also needed. It is largely diurnal or crepuscular in Tanzania.

The species is one of the more social species of otter, and is frequently seen in groups. There appear to be quite dramatic seasonal changes in grouping patterns, leading to groups as large as 20 between January to May (Kingdon 1977). There are distinct sexual groupings with young or non breeding males being driven away from larger groups of males (Proctor 1963). Males are not tolerated by females and young of less than 3 months, during this time the females are

accompanied only by their young (Proctor 1963). Once the young are mobile the intolerance breaks down, and families may be joined by young of a previous litter (Proctor 1963) - this is probably when large groups are seen (Kingdon 1977).

Mortality and reproduction

Females may have their litters in rock crevices, floating papyrus, small islands, and even in roots or hollow branches of riverine trees (Kingdon 1977), probably in September (Proctor 1963). Gestation is just over two months, and the young stay in the den for the first two months, learning to swim as soon as they leave the den (Kingdon 1977). They stay continuously with the mother for nearly a year, although they reach adult size at around seven months, and the mother is fiercely defensive (Kingdon 1977). They attain sexual maturity in their third year. Litter size for the genus is 1-5, but ususually two or three (Nowak 2005).

Not much is known about their mortality, however they do get tangled and drown in fishing nets. A struggling otter frequently attracts other group members, which also get caught and drown (Kingdon 1977). The species may be hunted by some cultural groups, who prize the fur. Kingdon (1977) notes that the fur is worn as a wristlet as it is thought to help treat infections of the eyes or nose. Captive otters have a high mortality, suggesting they may be subject to a variety of diseases (Kingdon 1977).

Distribution and habitat

The published distribution is extensive, stretching across most of sub-Saharan Africa, but excluded from arid habitats such as the Sahara desert, the horn of Africa, north east Kenya, most of central Tanzania, northern Mozambigue, Zimbabwe, South Botswana, Namibia, and much of South Africa (Foster-Turley et al. 1990). However this distribution probably reflects the lack of information about the species.

Previous maps of distribution in Tanzania suggest the species occurs along the borders of the country and by the rift lakes, but is absent from the rest of the country (Foster-Turley et al. 1990). Kingdon (1977) notes the species as being common in parts of Lake Victoria around rocky shores, and also occurring in Lake Tanganyika and Nyassa, but lists the species as absent from most of the eastern rift valley lakes and from many of the east coast rivers. It is difficult to confirm or deny this, as the species can easily be confused with the cape clawless otter; however Tanzania Carnivore Atlas records suggest that there is potential for the species to be more widespread in the country.

Northern region - Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi

The species is listed as occurring in the Serengeti National Park (Sinclair & Arcese 1995); however we have received no records of it occurring there, except outside the western corridor on the shores of Lake Victoria. There is also a record near Musoma, again on the shores of Lake Victoria, but no records elsewhere in the region.

Maasai steppe - Tarangire, Manyara, Simanjiro, Mkungunero.

There is a record of otter scat from Manyara National Park, and the presence of fish in the scat suggests spotted necked otters; however there are no records from elsewhere in the region.

North west and central region - Ugalla, Mahale, Minziro, Bukoba, Rubondo, Singida, Dodoma, Tabora, Moyowosi/Kigosi.

The species has been recorded in Rubondo National Park, which is one of the most reliable places to see the species. There is also a record from Moyowosi Game Reserve and a record from Mahale Mountains National Park. There are also two records of the species from the Dodoma region. The species is likely to occur in other areas around Lake Victoria. There are historical records from this area from Bukoba and Kagera river (Proctor 1963) and Kaserazi island (Elliot 1940). There is also a historical record from Ugalla game reserve (Thomas 1962).

Rukwa-Lukwati - includes Katavi, Ruaha, Rungwa, Lwafi

There is a record for the species from the north of Katavi National Park, but no records from elsewhere in this region. The southern highlands project has recorded the species to the east of Usangu Game Reserve.

Selous-Niassa - includes Mikumi, Lindi
There are no records of the species across this region.
Coast - includes Mtwara, Zanzibar and Saadani
There are no records of the species across this region.
Southern highlands - includes Mbeya, Rungwe, Kitulo, Mpanga/Kipengere
The species has been recorded on the shores of Lake Nyasa by the southern highlands project, but there are no records from elsewhere in the region. There are historical records from Mbamba bay, Lake Nyasa (Swynnerton 1951) and from the southern end of Lake Tanganyika (Proctor 1963).
Eastern arc mountains - includes Usambaras, Uluguru, Udzungwa
The southern highlands project has recorded the species close to Iringa.

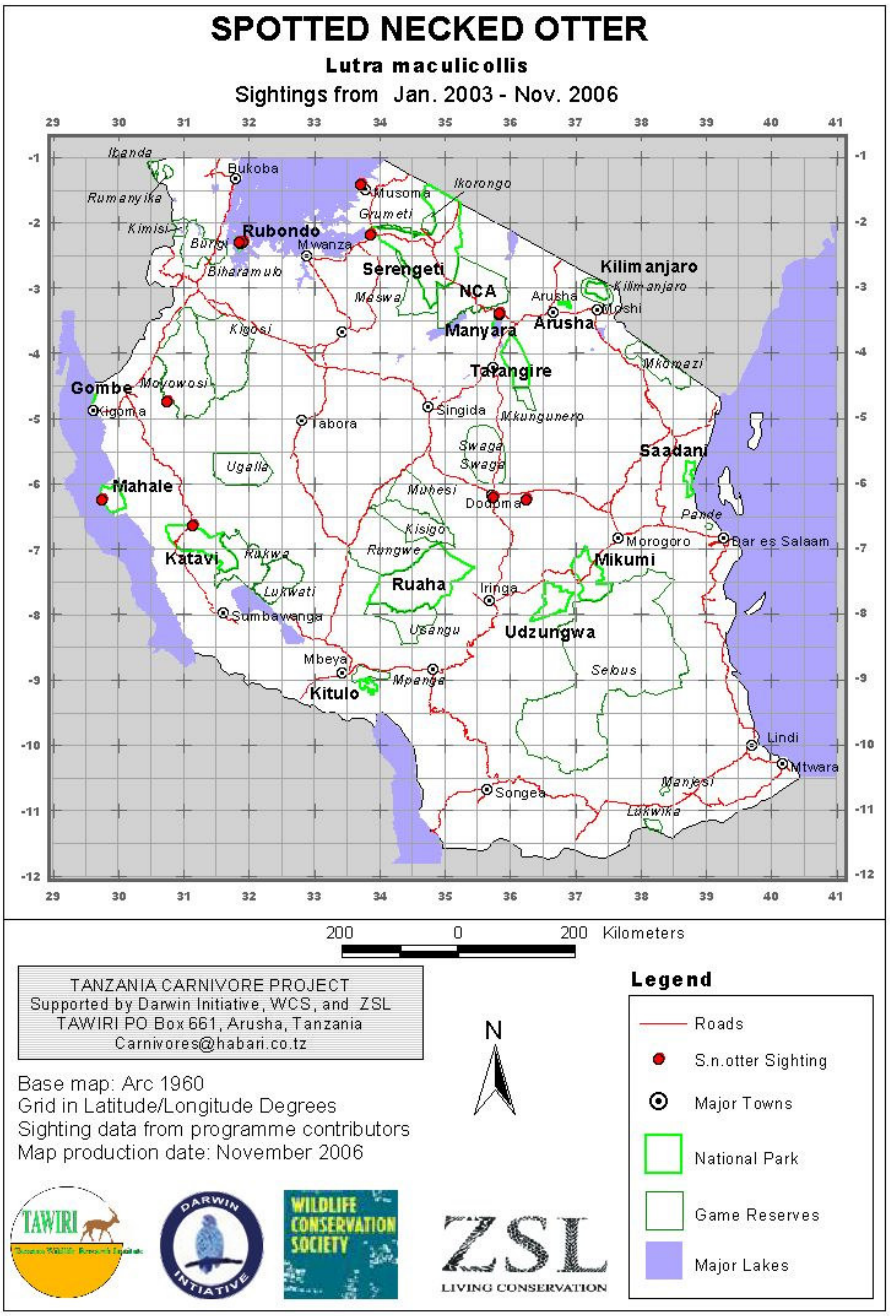

Fig. 9 Map of known sightings of spotted necked otter submitted to the Tanzania Carnivore Project since 2002 up until the time of the workshop. Data submitted are in two forms, either as direct GPS locations, or as a grid square as identified on the map. The former data type are plotted on the map directly, whilst the latter data type are plotted at the centre of the reported grid square.

4.5 Cape Clawless otter: Summary of current knowledge.

Scientific name: *Aonyx capensis*
Other names in use in Tanzania: Cape clawless or African clawless otter (English), fisi maji (Kiswahili – note this name is the same as for other otter species).

CITES: Appendix II. 2006 quota for Tanzania: 100 live animals.
IUCN Red list: Least concern (2004), population stable.

Fig. 10 Cape clawless otter photographed in Mahale Mountains National Park.

Physical description
This species is substantially larger than the spotted neck, it is also stockier and has a shorter tail relative to body length. It is usually dark brown, however it is paler ventrally but without the spots and streaks which characterise the spotted necked otter. The pale ventral colour stretches up along the side of the face up to the ear edges. It can be easily confused with the Congo clawless otter, but for this species the pale ventral colour is much paler, close to white, and there is a clearly defined black mark between the eyes and the nostrils. The paws are unwebbed and claws are almost completely absent. There are five digits on both hind and fore feet, which are clearly marked in spoor. Head and body length is 72-91cm, tail is 40-71cm. Males are slightly heavier than females, weighing 20(18-28)kg on average compared with 18(13-19)kg for females (Kingdon 1977). Young otters chirp continuously, whilst adults make a loud contact whistle. A miaowing wail which at high intensity breaks into a fierce bark denotes mild aggression (Kingdon 1977). The dental formula is 3/3-1/1-4/3-1/2=36.

Ecology
The species can occupy a wide range of habitats, providing there is water, ranging from swamps, rivers, streams, lakes and estuaries at all altitudes (Kingdon 1977). It has been recorded on sea coasts as well as near freshwater. It depends mainly on crustaceans, molluscs, bony mudfish of the silurid suborder and water tortoises. The freshwater crab, Potamonautes, is probably the most important food in most areas (Kingdon 1977). The range of prey recorded includes mussel-like *Unio* spp., large aquatic snails of the genera *Pila* and *Lanistes*, catfish *Bagrus* and *Clarias*, mud turtles, *Pelomedusa*, and frogs, water fowl and eggs, monitor lizard and crocodile eggs, cane rates and other rodents, and dragonfly larvae (Kingdon 1977). They can subsist in areas where freshwater crabs are absent (Watson & Lang 2003).

The species is less sociable than the spotted necked otter, and is seldom seen in groups larger than four or five individuals, and it is nocturnal. Three distinct groups were known to inhabit <5km of the wooded Ruanda Valley in south western Tanzania (Kingdon 1977), but aside from this observation there is no information on ranging elsewhere in Tanzania. Droppings are placed along water edges, usually at resting spots overlooking water (Kingdon 1977). On south African coasts, this species has been recorded at densities of 1/1.9km of coast, with dens spaced at intervals of 470m (Arden-Clarke 1986). A single radio tracked male had a minimum home range of 19.5km of coast with a core area of 12.0km, whilst a female had a 14.3km home range with a 7.5km core

area, and the home ranges of 4 adult males overlapped completely and were seen foraging together. This leads to the conclusion that there was a clan-type social organisation in this species with groups of related animals defending joint territories (Nowak 2005).

Mortality and reproduction

Gestation is 63 days, and 2-5 young are born in holt, which is place in a burrow, crevice, root or reed tangle (Kingdon 1977). It is not clear as to whether breeding is seasonal. The young otters open their eyes at about 4 weeks and emerge from the holt for periods from this time. At one year old the young lose their woolly fluff and acquire an adult coat. Ottters have been killed by crocodiles and monitor lizards (Kingdon 1977). The species is not thought to be attracted to fishing nets like the spotted necked otter, due to its preference to crabs rather than fish, and hence is not a danger to fisheries. However, like the spotted necked, its fur is prized.

Distribution and habitat

The published distribution is extensive, stretching across most of sub-Saharan Africa, but excludes very arid habitats such as the Sahara desert, the horn of Africa, north east Kenya, Namibia and Botswana. It is also excluded from the central African rainforest which is occupied by the congo clawless otter (Foster-Turley et al. 1990).

Previous maps of distribution in Tanzania suggest the species is widespread across the country (Foster-Turley et al. 1990). It is difficult to confirm or deny this, as the species can easily be confused with the spotted necked otter, however Tanzania Carnivore Atlas records, although limited, are also widespread.

Northern region - Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi

The species is not listed as occurring in the Serengeti National Park (Sinclair & Arcese 1995) and we have received no records of the species from this region. However there is a historical reference to the species occurring in the park (Watson 1968).

Maasai steppe - Tarangire, Manyara, Simanjiro, Mkungunero.

There is a record of otter scat from Manyara National Park, and the presence of crustaceans in the scat suggests clawless otters; however there are no records from elsewhere in the region.

North west and central region - Ugalla, Mahale, Minziro, Bukoba, Rubondo, Singida, Dodoma, Tabora, Moyowosi/Kigosi.

The species has been recorded in Rubondo National Park, inland, rather than on the lake shore like the spotted necked otter. There is also a record from southern Moyowosi and a clear photograph (Fig. 10) from Mahale Mountains National Park, which was verified to be the cape clawless species and not the congo clawless. There are also records of the species from the Dodoma region.

Rukwa-Lukwati - includes Katavi, Ruaha, Rungwa, Lwafi

There are records for the species from Katavi National Park and a record from Ruaha National Park, but no records from elsewhere in this region. The southern highlands project has recorded the species to the south of Katavi.

Selous-Niassa - includes Mikumi, Lindi

There is a record of the species from Mikumi National Park.

Coast - includes Mtwara, Zanzibar and Saadani

There is a single record of the species occurring close to the coast between Dar es Salaam and Lindi of unconfirmed veracity.

Southern highlands - includes Mbeya, Rungwe, Kitulo, Mpanga/Kipengere

The southern highlands project has recorded the species in Mbeya region and the area of the Livingstone Mountains and Mount Rungwe.

Eastern arc mountains - includes Usambaras, Uluguru, Udzungwa

There are records of the species around Iringa and in Udzungwa Mountains National Park, and the southern highlands project has recorded the species in the same areas.

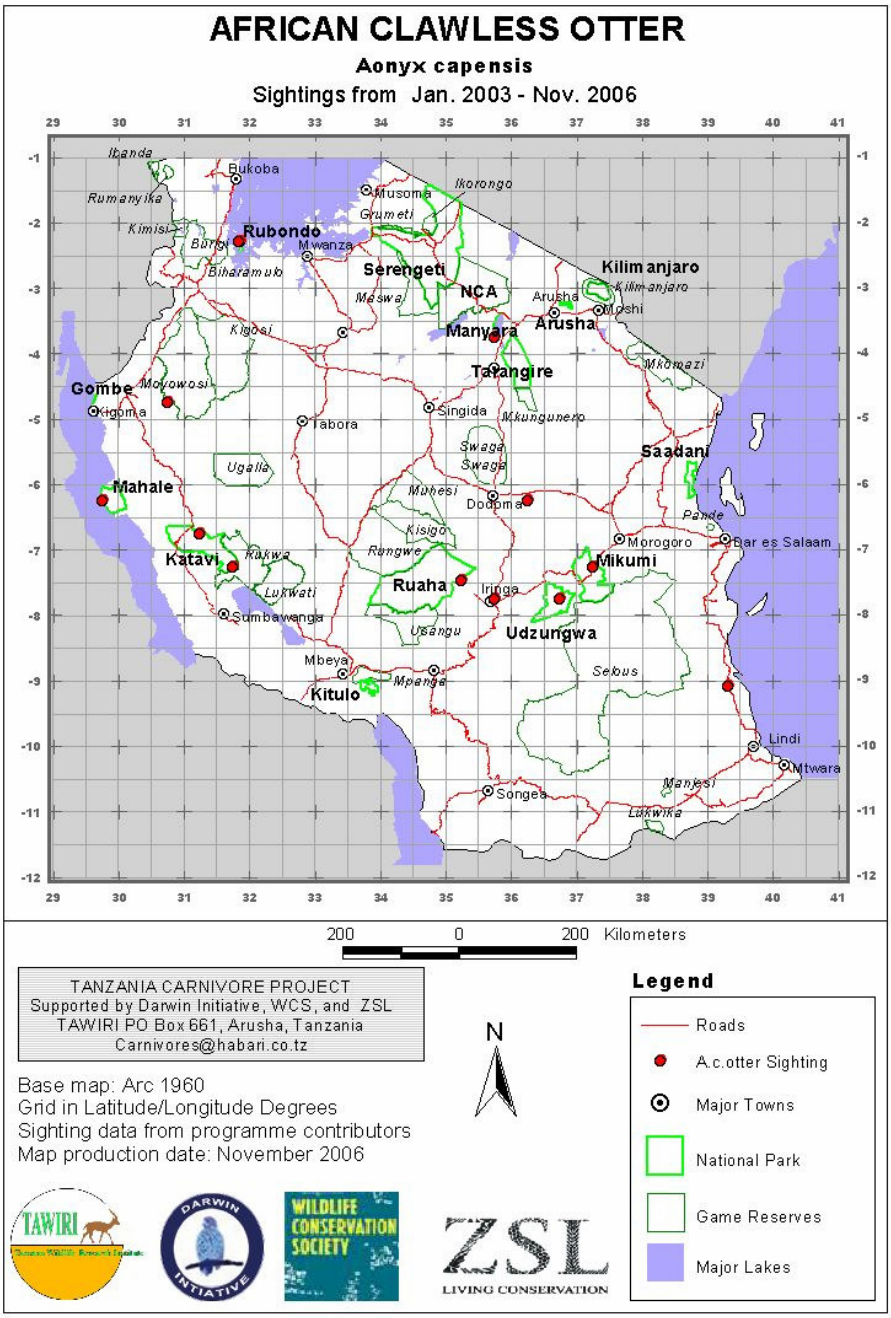

Fig. 11 Map of known sightings of the cape clawless otter submitted to the Tanzania Carnivore Project since 2002 up until the time of the workshop. Data submitted are in two forms, either as direct GPS locations, or as a grid square as identified on the map. The former data type are plotted on the map directly, whilst the latter data type are plotted at the centre of the reported grid square.

4.6 Striped weasel: Summary of current knowledge.

Photo from web fig 12

Scientific name: *Poecilogale albinucha*
Other names in use in Tanzania: Striped weasel (English), Chororo (Kiswahili), Njololo (Kisukuma), Mbilis (Maa).
CITES: Not listed.
IUCN Red list: Least concern (1996), population trends not listed.

Physical description.
A black and white striped weasel, similar to the zorilla, except smaller, with the white fur on the face extending over the top of the face, a completely white tail, much shorter fur and very short legs. The coat is black with four white and three black stripes down the back, the legs and underparts are black. It should be noted that the white colour can vary in the same individual, to light yellow or even a quite deep buff (Kingdon 1977). The head and body length is 25-36cm, the

tail 13-23cm (Kingdon 1977). Males are larger than females, in southern Africa weighing on average 263(218-355)g compared with 173(116-257)g for females (Skinner & Smithers 1990). There are 5 digits on each foot, however the fist digit only shows in spoor of the fore foot, the hind foot appearing to have only 4 digits (Skinner & Smithers 1990). Claws usually mark on the spoor. The species is usually silent but can utter a loud sound between a growl and a shriek when alarmed, and has several vocalisations associated with threat, defense and greeting (Nowak 2005). The dental formula is 3/3-1/1-2/2-1/1=28.

Ecology

There is very little known about this species. It is almost entirely nocturnal, and is probably rarely above ground or outside thick vegetated habitat. It is found in a variety of habitats including forest edge, grassland and marsh (Nowak 2005). It has been suggested that the species depends on gerbils, blesmols and/or root rats, and is adapted to hunt within their burrows (Kingdon 1977). Their diet consists mainly of small mammals and birds but also includes snakes and insects. The weasel catches and kills its prey by grabbing the throat or the neck and hanging on until the victim is dead. It can capture large prey relative to its body size, including springhare. It kills venoumous snakes by repeatedly provoking the snake to strike, until the snake tires and slows when it can be seized by the back of the head. They have a large appetite, and will eat three to four rats a night (Kingdon 1977).

The species generally rests during the day within a burrow, which ends in a rounded chamber in which they horde prey. The area around the den is usually marked with defecation (Kingdon 1977). They occasionnally raid chicken yard and will eat birds. When trapped, striped weasels are either single, in pairs, or in groups of an adult female and up to three young (Kingdon 1977), however not much else is known about the social or ranging behaviour. The species is able to emit a noxious odor from its anal glands when under stress or attack.

Mortality and reproduction

Gestation is 31-33 days with a litter size of 1-3 kits. Females are polyestrous and can mate a second time in a season if their first litter is lost. Kits start taking solid food after 35 days, open their eyes at 51-54 days, are completely weaned at about 11 weeks, and are nearly full grown at 20 weeks (Nowak 2005). A male has been recorded as first mating at 33 months and a female had her first litter at 19 months. Longevity is unknown, although there is a report of one individual living for 5 years after capture (Smithers 1971).

There is no information on mortality; however it is almost certainly at risk from domestic dogs. Its skin is used for ornaments and medicine.

Distribution and habitat

There is very little information on the distribution of this species. Published records suggest the species occurs from the north of the DRC to South Africa, but is excluded from Namibia. The species is thought to be widespread across Tanzania (Kingdon 1977, 2004), however it seems to have a sporadic distribution, occurring frequently in some areas but then not being seen or recorded across wide areas in between.

Northern region - Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi

There are two records of the species from this region - the edge of Serengeti National Park and Loliondo Game controlled area, and another to the south east of Lake Natron.

Maasai steppe - Tarangire, Manyara, Simanjiro, Mkungunero.

There are no records of the species from this region.

North west and central region - Ugalla, Mahale, Minziro, Bukoba, Rubondo, Singida, Dodoma, Tabora, Moyowosi/Kigosi.

There is a single recent record of a specimen found dead on the road from this region – from Minziro Forest Reserve. There are historical records from Bukoba and Tabora (Swynnerton 1951) and from Minziro and Bukoba, between Moyowosi and the Tanzania border, Tabora, Singida Area and just south east of Mahale Mountains National Park (Kingdon 1977).

Rukwa-Lukwati - includes Katavi, Ruaha, Rungwa, Lwafi
There are no records of the species from this region. There are historical records from the immediate east of Lukwati Game Reserve (Kingdon 1977).
Selous-Niassa - includes Mikumi, Lindi
There are no records of the species from this region.
Coast - includes Mtwara, Zanzibar and Saadani
There are no records of the species from this region.
Southern highlands - includes Mbeya, Rungwe, Kitulo, Mpanga/Kipengere
There are no records of the species from this region from the carnivore atlas; however the southern highlands project reports the species as present in the Rungwe-Kitulo area and Mbeya region.
Eastern Arc Mountains - includes Usambaras, Uluguru, Udzungwa
There are no records of the species from this region from the carnivore atlas; however the southern highlands project reports the species as present in Iringa and Morogoro and the Udzungwa Mountains National Park.

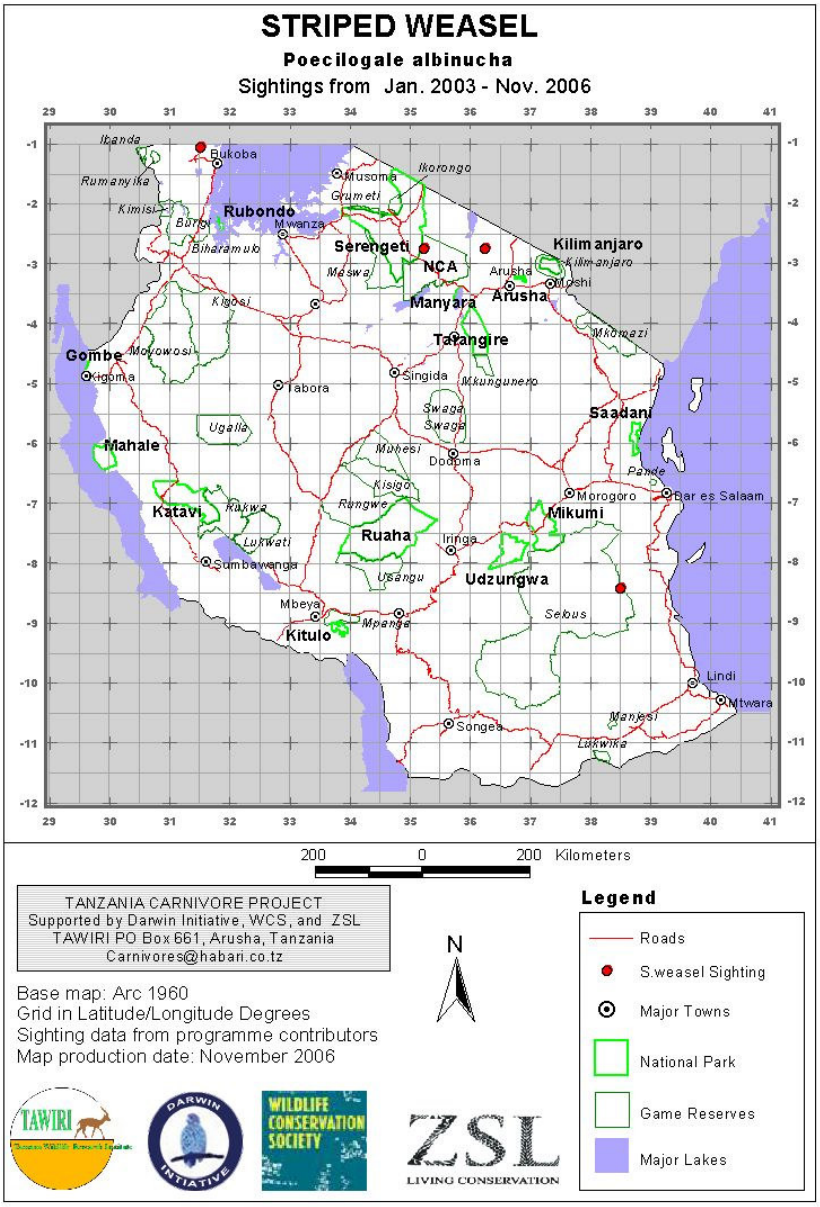

Fig. 13 Map of known sightings of the striped weasel submitted to the Tanzania Carnivore Project since 2002 up until the time of the workshop. Data submitted are in two forms, either as direct GPS locations, or as a grid square as identified on the map. The former data type are plotted on the map directly, whilst the latter data type are plotted at the centre of the reported grid square.

4.7 Zorilla: Summary of current knowledge.

Photo – from camera traps – fig 14

Scientific name: *Ictonyx striatus*
Other names in use in Tanzania: Zorilla or striped polecat (English), Kicheche (Kiswahili), Olipilis (Maa), Kainai (Kiiraqw), Kipoporu (Kichagga), Nyilili (Kisukuma).
CITES: Not listed.
IUCN Red list: Least concern (1996), population trends not listed.

Physical description
A black and white polecat, similar to the striped weasel except larger and with less white above the face, much longer fur and a bushy tail, dark at the base. The head and body length is 34(28-38)cm, the tail 23(20-30)cm and the weight 1.3(1.02-1.4)kg (Kingdon 1977). The face markings have been noted as being highly variable between individuals and hence could be used for individual recognition (Kingdon 1977). They do not vocalise much, grunting occasionally, and growling when alarmed. There are five digits on each foot and all five digits mark the spoor (Skinner & Smithers 1990). The dental formula is 3/3-1/1-3/3-1/2=34.

Ecology
The zorilla has a wide habitat range from woodlands and grass savannas, to highland areas, but seems to avoid dense forests (Nowak 2005). Diet appears to centre on beetles and their larvae and mice, but also includes all small mammals up to the size of a hare, small and medium sized birds, reptiles and their eggs, frogs and a varity of invertebrates, mainly insects (Kingdon 1977; Skinner & Smithers 1990). Food is found by scent and is very often dug out of dry dung. The species is almost entirely nocturnal. Zorillas seem to have a fairly nomadic existence, but nothing much is known about sociality or ranging behaviour, although they are thought to be solitary (Nowak 2005).

When the zorilla is distressed or alarmed, it will spray a foul smelling and caustic secretion from anal stink glands, and may also sham death (Kingdon 1977). This scent may explain why dead zorillas on roads tend to persist longer than other species, as scavengers seem to avoid them.

Mortality and reproduction
Gestation is 36 days with a litter size of 2-3 kits (Kingdon 1977). The species gives birth in a burrow which may be natural or dug by the mother. The young are born blind, take solid food after about 32 days, open their eyes at 40 days, are completely weaned at 18 weeks, and almost full grown at 20 weeks (Nowak 2005). A male has been recorded as first mating at 22 months and a female bor her fist litter at 10 months. A captive zorilla has been recorded as living over 13 years (Nowak 2005). Zorillas are frequently killed on roads. Diseases are unknown.

Distribution and habitat
There is very little information on the distribution of this species, however despite its wide distributional range it is thought to be nowhere common (Skinner & Smithers 1990). It has a widespread range across Tanzania (Kingdon 1977).

Northern region - Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi
There are no records of the species from inside the Serengeti National Park, however it is recorded on the edge of the park to the north east and west, as well as on the border with Ngorongoro Conservation Area. These sightings include camera trap records in Ngorongo highlands where the species was trapped frequently (16 records out of 915 camera trap days). There are no records from Grumeti, Ikorongo and Maswa Game Reserves. There are several records from Ngorongoro highlands around the crater and to the north east of the conservation area. There is a further record between Ngorongoro and Arusha, and several records in Arusha and Kilimanjaro National Parks, including camera trap photos during a survey in Arusha National Park. There are no records

from the Lake Natron area or from Loliondo Game Controlled Area with the exception of an observation on the boundary of the Serengeti National Park. There are no recent records from Mkomazi Game Reserve; however the species is listed as being present historically (Eltringham et al. undated).

Maasai steppe - Tarangire, Manyara, Simanjiro, Mkungunero.

The species has been recorded in Manyara and Tarangire National Parks, and to the west of Tarangire towards Singida, but nowhere else in the region.

North west and central region - Ugalla, Mahale, Minziro, Bukoba, Rubondo, Singida, Dodoma, Tabora, Moyowosi/Kigosi.

There are recent records from Mahale Mountains National Park and east of Dodoma, but no records from elsewhere in the region. There are historical records from Bukoba and Tabora (Swynnerton 1951) and from Tabora, Bukoba, north of Kigosi Game Reserve and Tabora (Kingdon 1977).

Rukwa-Lukwati - includes Katavi, Ruaha, Rungwa, Lwafi

There are records from Katavi National Park but no other records from this region.

Selous-Niassa - includes Mikumi, Lindi

There are no records of the species from this region. There are historical records from north of Manjesi Game Reserve (Kingdon 1977).

Coast - includes Mtwara, Zanzibar and Saadani

There are no records of the species from this region, however the species was listed as being present near Lindi nearly 100 years ago (Hollister 1919).

Southern highlands - includes Mbeya, Rungwe, Kitulo, Mpanga/Kipengere

There are no records of the species from this region from the carnivore atlas, however the southern highlands project report the species as present in the Rungwe-Kitulo area and Mbeya region.

Eastern arc mountains - includes Usambaras, Uluguru, Udzungwa

There are no records of the species from this region from the carnivore atlas, except for the vicinity of Iringa town. The southern highlands project also reports the species as present in Iringa, and additionally list it as being present in Morogoro region and the Udzungwa Mountains National Park. There are historical records from the Usambaras and Pare Mountains (Kingdon 1977).

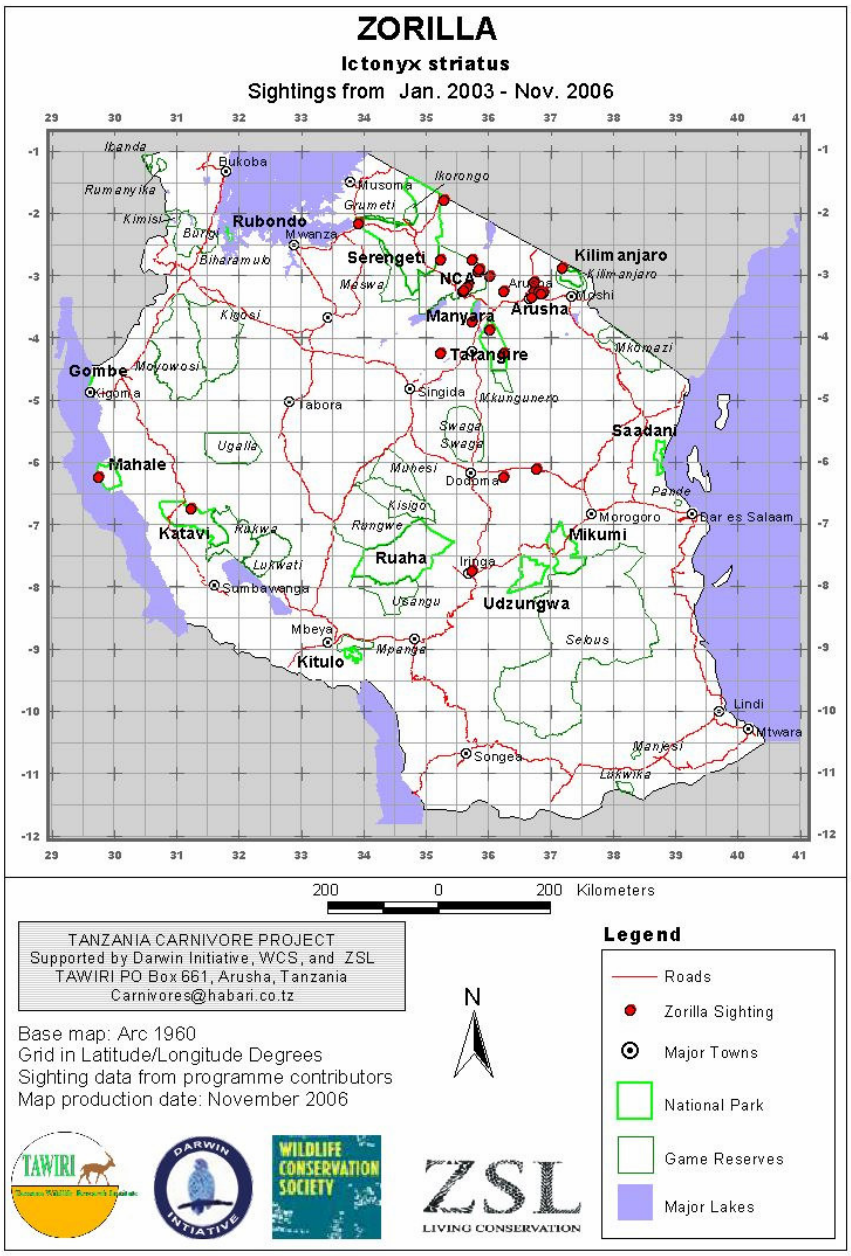

Fig. 15 Map of known sightings of the zorilla submitted to the Tanzania Carnivore Project since 2002 up until the time of the workshop. Data submitted are in two forms, either as direct GPS locations, or as a grid square as identified on the map. The former data type are plotted on the map directly, whilst the latter data type are plotted at the centre of the reported grid square.

4.8 Honey badger: Summary of current knowledge.

Fig. 16. Honey badger

Scientific name: *Mellivora capensis*

Names in use in Tanzania: Honey badger or ratel (English), Nyegere (Kiswahili), Nkarungurungi (Maa), Iselle (Kichagga)
CITES: Appendix III/w. 2006 quota for Tanzania: 100 live animals
IUCN Red list: Least concern (1996), population trends not listed.

Physical description
The honey badger is a thick set animal, with grey upperparts, surrounded by a white border, and black underparts and limbs. The legs are short and have very large strong claws. The skin is very loose and extremely tough (Nowak 2005). Anal glands secrete a vile smelling fluid which is probably used for self defence. Head and body length is 60-77cm, tail length 16-30cm and weight 8(7-13)kg (Kingdon 1977). The paws each have five digits with long non-retractable claws which mark in the spoor (Skinner & Smithers 1990). The species is usually silent except for a harsh grating growl when annoyed (Nowak 2005). The dental formula is 3/3-1/1-3/3-1/1=32.

Ecology
Honey badgers occur across a wide range of habitats, ranging from savannah to forest and wet grasslands, although they are thought to prefer dry areas. They are largely nocturnal, resting during the day among rocks, in hollow logs or trees, and in burrows, which it is able to dig itself. They are sometimes also active diurnally, and are probably flexible in their habits. Its diet includes small mammals, the young of large mammals, birds, reptiles, including tortoises, arthropods, carrion, and vegetation. Much of the badger's food is dug out of the ground by its powerful front legs and claws. Honey and bees are an important component of the diet, particularly at certain times of the year (Kingdon 1977). Damage to hives by ratels in central and western Tanzania peaks in July and October, and is low during the rainy season (Kingdon 1977), suggesting that honey is particularly important in the diet at this time. It is because of badger's preference for honey that the species has developed a remarkable association with a bird – the honey guide (Indicator indicator). The bird will lead a badger to a bee hive by calling repeatedly using a characteristic call; the badger, on hearing the call, will follow the bird, and when it finds the hive, break it open and eat the honey. There is always a substantial amount of honey and insects left over to reward the bird, leading to a profitable symbiotic association. Honey badgers are primarily terrestrial, but it can climb, which it does in pursuit of honey.

Honey badgers are generally seen alone or in pairs. There is little information on social behaviour or ranging patterns, but they are occasionally seen in larger groups. The species has a well deserved reputation of being very aggressive and devoid of fear, and has even been known to steal kills off of adult male lions (van Lawick pers. comm., Kingdon 1977).

Mortality and reproduction
There is little information on reproduction or mortality for this species and what there is comes from outside east Africa. Honey badgers have a gestation period of 153-162 days and produce litters of 1-4 cubs (usually 2) (Hancox 1992). The young are born in a grass lined chamber and remain close to the burrow for a long time. They reach puberty at about 1 year old. The species is known to suffer from canine distemper, and *strongyloides* and *Artyfechinostornum* have been recorded in a badger in India (Kingdon 1977). The longest lifespan recorded in captivity was over 26 years (Nowak 2005).

Distribution and habitat
There is very little information on the distribution of this species. The species occurs across a wide range of habitat from open, dry savanna to dense forest and from the Cape to Morocco and Ethiopia, Sudan and Somalia, excluded only from sand desert. Despite this wide range it is thought to be nowhere common (Skinner & Smithers 1990). It also ranges across Arabia stretching as far east as India and Nepal. The species is thought to be widespread across Tanzania (Kingdon 1977).

Northern region - Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi

There are many records of the species from inside the Serengeti National Park, although these are concentrated in the south of the park where most observers are based, and there is only one record to the north of the park near Kleins, and another record near Ikoma. There are records from Grumeti Game Reserve and south east Maswa Game Reserve, but no records from Ikorongo Game Reserve. There are many records from Ngorongoro Conservation Area, particularly the area bordering the Serengeti, but also from the highlands and the north east boundary. There are fewer records outside protected areas; however there is a record to the west of Lake Natron. There are many records of the species in Kilimanjaro and Arusha National Parks, and the species has been recorded in the latter park during a camera trap survey (1 photo out of ??? camera trap days). There are no recent records from Mkomazi Game Reserve, however there are older records (Kingdon 1977, Eltringham et al. undated).

Maasai steppe - Tarangire, Manyara, Simanjiro, Mkungunero.

The species has been recorded to the south of Manyara National Park, but not actually inside the protected area, it has also been recorded in Tarangire National Park, including 5 sightings out of 1169 camera trap days during a camera trap survey, and to the east of Tarangire towards Arusha. Although the species has not been recorded elsewhere in the region, the frequency of observations suggests that it is likely to be present across much of the region.

North west and central region - Ugalla, Mahale, Minziro, Bukoba, Rubondo, Singida, Dodoma, Tabora, Moyowosi/Kigosi.

There are records in Mahale Mountains National Park, Minziro Forest Reserve (including 1 camera trap record) and east of Dodoma, but no records from elsewhere in the region. There are historical records from Bukoba, Burigi game reserve, northern Kigosi Game Reserve, and the area around northern Tanganyika (Kingdon 1977), there is also a published record from Lake Manyara Park (McColaugh 1989).

Rukwa-Lukwati - includes Katavi, Ruaha, Rungwa, Lwafi

There are records from Katavi and Ruaha National Parks, as well as from the boundary between Muhesi and Kisigo Game reserves, but no other records from this region. The southern highlands project also support observations in Katavi and have recorded the species in a camera trap survey in Lwafi Game Reserve. Kingdon (1977) reports numerous observations of the species close to Lake Rukwa, and Vesey-FitzGerald (1964) also reports the species to be present in the Rukwa valley.

Selous-Niassa - includes Mikumi, Lindi

There is a single record of the species from this region from the northern Selous Game Reserve. There are several historical records from the Selous (Kingdon 1977, Caro 1998a?), Mikumi National Park (McColaugh 1989) and Kilombero valley (Starkey 1997).

Coast - includes Mtwara, Zanzibar and Saadani

There is a single record of the species close to the coast between Lindi and Dar es Salaam.

Southern highlands - includes Mbeya, Rungwe, Kitulo, Mpanga/Kipengere

There are no records of the species from this region from the carnivore atlas, however the southern highlands project have recorded footprints and scat in the Rungwe-Kitulo ecosystem in Mbeya region.

Eastern Arc Mountains - includes Usambaras, Uluguru, Udzungwa

The species has been recorded many times in Udzungwa Mountains National Park, south of the Udzungwas, and to the north of the Selous. There are no records from the carnivore atlas of the species elsewhere in this region, however The southern highlands project also reports the species as present in the Udzungwas, and additionally lists it as being present in Iringa and Morogoro regions, and have recorded it in camera trap surveys in the north and the south of the Udzungwas and Mabtwa and Matund forests. There are historical records from the Usambaras (Kingdon 1977).

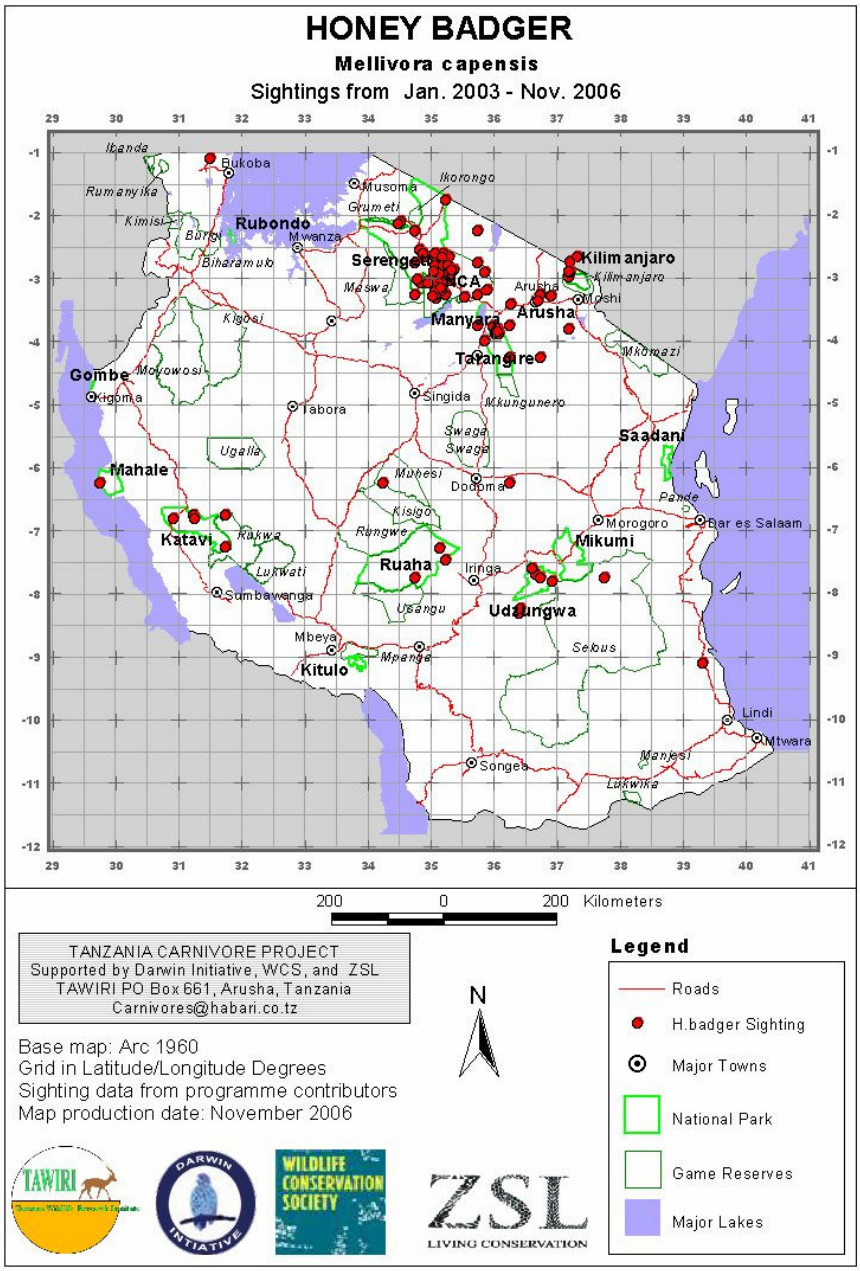

Fig. 17 Map of known sightings of the honey badger submitted to the Tanzania Carnivore Project since 2002 up until the time of the workshop. Data submitted are in two forms, either as direct GPS locations, or as a grid square as identified on the map. The former data type are plotted on the map directly, whilst the latter data type are plotted at the centre of the reported grid square.

4.9 Golden Jackal: Summary of current knowledge

Fig 18 Golden jackal.

Scientific name: *Canis aureus*
Names in use in Tanzania: Golden or common jackal (English), Bweha wa mbuga (Kiswahili)
CITES: Appendix III.
IUCN Red list: Least concern (2004), population trends increasing.

Physical description
The golden jackal is a medium sized canid, which has a coat colour ranging from a pale creamy yellow to a dark tawny hue seasonally. The coat on the back is often a mixture of black brown and white hairs which can make the species appear to have a dark back similar to the black backed jackal. The tail is bushy with a tan to black tip. The legs are relatively long and the feet are slender with small pads. Mean body mass of 5.8kg for females and 6.6kg for males (Moehlman and Hofer 1997), head to body length in India has been published as ranging from 74-84 cm and tail length of 20-24cm, however Indian jackals appear to be heavier than east African jackals (Sillero-Zubiri et al. 2004). There are as many as 12 subspecies described across the range. Vocalisations consist of a complex howl repertoire beginning with 2-3 low pithc howls and culminating in a high pitched staccato of calls (Sillero-Zubiri et al. 2004).They are easily induced to howl by other jackals. The dental formula is 3/3-1/1-4/4-2/3=42.

Ecology
Golden jackals are omnivorous and opportunistic. Their diet varies according to season and habitat. In Tanzania, they consume invertebrates, fruit, rodents, lizards, snakes, birds, hares and Thomson's gazelle (Sillero-Zubiri et al. 2004). In other areas diets are similarly variable, although the different contributions each component makes varies markedly. Single jackals hunt smaller prey such as rodents, hares and birds and use their hearing to locate rodents in the grass and then pounce on them by leaping in the air. They also dig out gerbils from their burrows and have been observed to hunt young, old and infirm ungulates that can be 4-5 times their body weight (Sillero-Zubiri et al. 2004); however packs are much more successful than single individuals at hunting larger prey. In some areas jackals are heavily reliant on carrion and garbage. Golden jackals often scavenge off of kills of other predators, such as lion, leopard, spotted hyaena, wild dog and cheetah. They may cache food by burying for later consumption. They can coexist with the other two species of jackal – black-backed and side striped, probably through resource partitioning.

Their social organisation is reported to be extremely flexible depending on availability and distribution of food resources (Sillero-Zubiri et al. 2004). The basic social unit is a breeding pair of a male and female, but this can sometimes be accompanied by a current litter of pups and/or offspring from former litters (Moehlman 1983, 1986, 1989). The species usually forms long term pair bonds and the pair marks and defends territories together, hunts, shares food and co-operatively rears young (Moehlman 1983, 1986, 1989). Average group size is 2.5 in Serengeti (Moehlman and Hofer 1997). Scent marking takes the form of urination and defecation around denning areas and on intensively used trails. Recorded home ranges vary from 1.1-20km^2 (Sillero-Zubiri et al. 2004).

Mortality and reproduction
In Tanzania there is a distinct breeding season, with mating typically occurring from October to December, with pups born after a 63 day gestation in December to March (Moehlman 1983, 1986, 1989). Timing of births coincides with an abundance of food supply – which is close to the start of the long rains in Tanzania. Females typically produce only one litter per year. Pups are born in underground dens, with 1-3 openings and which are 2-3m long and 0.5-1m deep. Young pups can be moved between 2-4 dens prior to emergence from the den. Mean litter size is 5.7 (range 1-8) in Tanzania, with an average of 2 pups emerging from the den at 3 weeks old (Wyman 1967). Pups are born blind, but their eyes open at 9 days and their teeth erupt at 11 days ater birth (Moehlman and Hofer 1997). The mother will continue to suckle the cubs for 8-10 weeks. Both parents and helpers from previous litters help provision and guard new pups. The male also feeds

his mate during her pregnancy and both male and helpers provision the female during lactation (Moehlman 1983, 1986, 1989, Moehlman and Hofer 1997). The presence of helpers results in higher pup survival (Moehlman 1986).

Spotted hyaenas have been observed to kill and eat golden jackals, and cheetah have been observed to chase them, and have killed and eaten other canids such as bat eared foxes and black backed jackals. It is likely they are vulnerable to other large carnivores in the ecosystem. Their propensity to scavenge means they are vulnerable to poisoned bait outside of protected areas. They are commonly killed on roads. They are vulnerable to canid diseases, such as rabies and distemper, and skin diseases scuh as mange and ticks and fleas. In Tanzania, golden jackals have been recorded as showing antibodies to canine parvovirus, canine herpes virus, canine coronovirus and canine adenovirus (Sillero-Zubiri et al. 2004). The maximum lifespan in the wild was recorded in the Serengeti at 14 years (Moehlman and Hofer 1997).

Distribution and habitat

The species is widespread across Northern Africa stretching as far east as Thailand and Myanmar, and as far north as Austria. Northern Tanzania represents the southernmost limit of its range. It is tolerant of dry habitats including semi-desert but can also live in the evergreen forests of Thailand, and has been recorded at elevations as high as 3,800m (Sillero- Zuberi 1996).

Within Tanzania, the published distribution includes the north east of the country, stretching around 300-400km south of the Kenyan border, from the Rwanda border in the west across to the vicinity of Kilimanjaro in the east, but not occurring within 200km of the coast. Generally, our pattern of sightings agrees with the published distribution, except for a lack of observations west of Lake Victoria, which is in agreement with the range published by Kingdon (1977). Given the species preference for drier areas in Tanzania, it seems unlikely that the species occurs in this region, although, in general, the carnivore atlas project receives limited information from these areas. Published densities in Tanzania can be quite high with densities as high as four adults per km^2 in Serengeti National Park (Moehlman 1983, 1986, 1989). A survey of the southern plains of the Serengeti estimated golden jackal density to be 0.47/km^2 (confidence limits 0.20-1.11) in the dry season 2002 and 0.58/km^2 (0.25-1.36) in the wet season 2003. Densities were strongly related to habitat and, whilst there were virtually no golden jackals in the long grass plains in both seasons, densities in the intermediate grass plains were 0.23/km^2 (0.09-0.57) and 0.46/km^2 (0.20-1.07); and in the short grass plains 0.66/km^2 (0.28-1.55) and 1.25/km^2 (0.53-2.92) in the dry and wet seasons respectively (Durant et al. under review). Preliminary results from a repeat survey in 2005 suggests that densities have not changed between surveys, however this population has declined from an earlier surveys conducted in 1977 and 1986 (Durant et al. under review). The causes for such a decline are unclear.

Northern region - Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi

There are many records of the species from inside the Serengeti National Park, although these are concentrated in the south of the park where most observers are based, and are limited to the plains area of the park. The population on the grass plains in the south of the park has declined since its levels in the 1970s but has been roughly stable 2002. There are no records to the north or west of the park near Kleins. There are also no records from Grumeti or Iknorongo Game reserves, but there is a record from the southeast of Maswa Game Reserve. There are many records from all across the Ngorongoro Conservation Area. There are fewer records outside the protected areas, however there are records to the west, south and east of Lake Natron, and there are many records of the species in and around Arusha National Park. There are no records from Kilimanjaro National Park, despite an intensive camera trapping survey there.

Maasai steppe - Tarangire, Manyara, Simanjiro, Mkungunero.

The species has been recorded in Manyara and Tarnagire National Parks, however not frequently. There are also records to the south of Lake Eyasi and from the south of Lake Manyara and it has been recorded 100km to the west of the boundary of Maswa Game Reserve.

North west and central region - Ugalla, Mahale, Minziro, Bukoba, Rubondo, Singida, Dodoma, Tabora, Moyowosi/Kigosi.

There are no recent or historical records of the species from this region.

Rukwa-Lukwati - includes Katavi, Ruaha, Rungwa, Lwafi

There are no recent or historical records of the species from this region; it is unlikely to be present.

Selous-Niassa - includes Mikumi, Lindi

There are no recent or historical records of the species from this region except for a single observation from Selous Game Reserve – this is most likely a black backed or side-striped jackal that was mistaken for a golden jackal.

Coast - includes Mtwara, Zanzibar and Saadani

There are no recent or historial records of the species from this region; it is unlikely to be present.

Southern highlands - includes Mbeya, Rungwe, Kitulo, Mpanga/Kipengere

There are no recent or historical records of the species from this region; it is unlikely to be present.

Eastern arc mountains - includes Usambaras, Uluguru, Udzungwa

There are no recent of historical records of the species from this region.

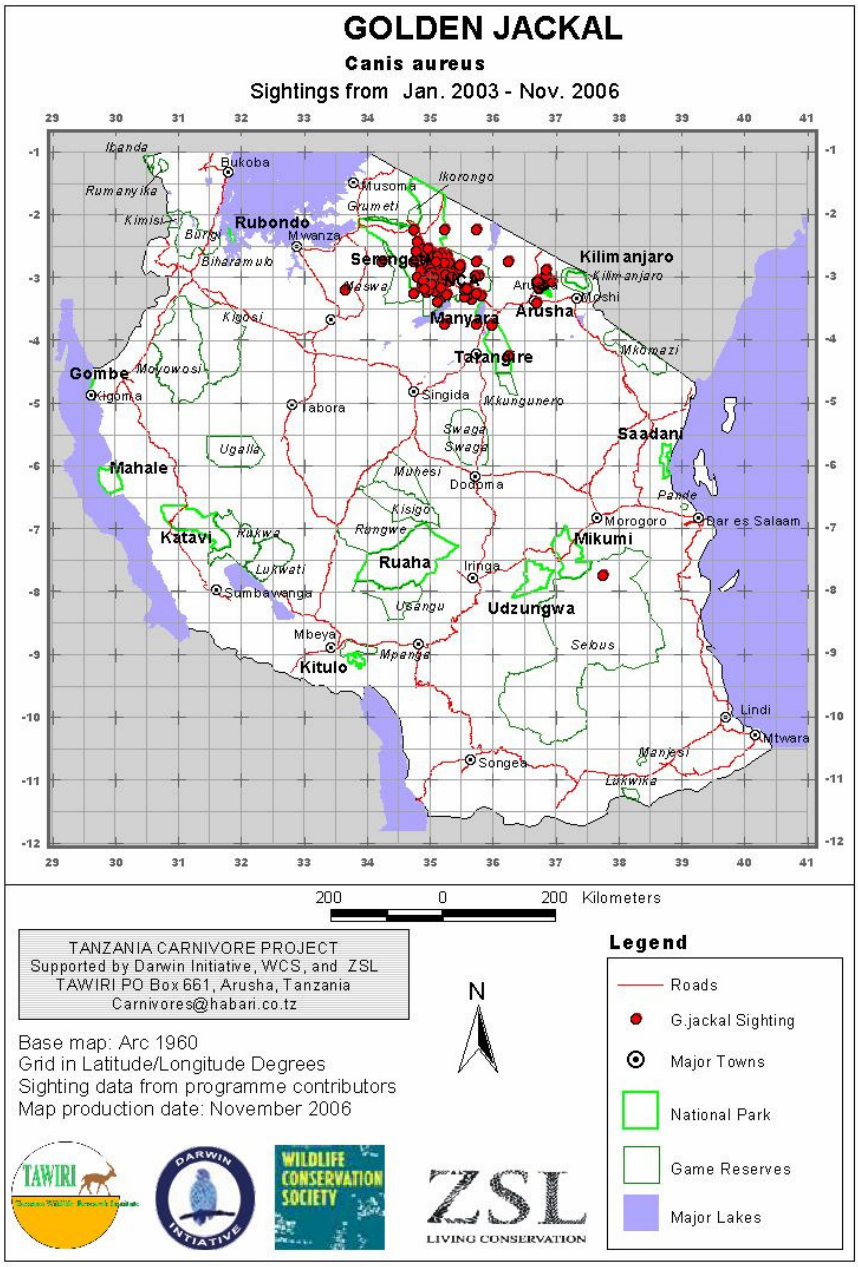

Fig. 19 Map of known sightings of the golden jackal submitted to the Tanzania Carnivore Project since 2002 up until the time of the workshop. Data submitted are in two forms, either as direct GPS locations, or as a grid square as identified on the map. The former data type are plotted on the map directly, whilst the latter data type are plotted at the centre of the reported grid square.

4.10 Black-backed Jackal: Summary of current knowledge

Fig. 20 Black-backed jackal

Scientific name: *Canis mesomelas*
Names in use in Tanzania: Black-backed or silver-backed jackal (English), Bweha Nyakundu (Kiswahili), Nchewe (Kihehe).
CITES: Not listed.
IUCN Red list: Least concern (2004), population trends stable.

Physical description
The black backed jackal is slightly larger than the golden jackal. The species is distinguished by a dark saddle on the back, a black, bushy tail and a red tinge to the flanks and limbs. Males are slightly larger than females. The overall body colour is rufous brown and there is a black stripe which slopes obliquely from behind the shoulder to the top of the rump. The back is marbled black and white which gives an overall silver appearance in mature individuals. In south Africa it has a mean body mass of 7.4kg for females and 8.1kg for males, head and body length ranges from 69-90 cm, and tail length 20-24cm (Stuart 1981); however weights differ between different areas and the average weight in East Africa is 8.5kg (Kingdon 1977), slightly higher than southern Africa. The dental formula is 3/3-1/1-4/4-2/3=42. There are 6 subspecies recognised, however Kingdon recognises only two: *C m. Mesomelas* in Southern Africa, and *C. m. schmidti* in East Africa and hence in Tanzania.

The species is very vocal and uses a high pitched whining howl to communicate within groups, and to advertise territories (Moelhman 1983, Estes 1991). There is a wide variety of alarm calls.

Ecology
Black backed jackals are generalist feeders and their diet varies with food availability, according to season and habitat. They have been recorded as consuming small to medium sized mammals including murids, springhares and young ungulates, reptiles, birds and birds eggs, carrion and human refuse as well as invertebrates and plants (Sillero-Zubiri et al. 2004). On the coast they have been recorded as eating beached marine mammals, fish and mussels. Invertebrates, such as termites and insects are commonly eaten. They often forage in pairs, and groups of as many as 10 individuals have been recorded at large carcasses of herbivores. Pairs of individuals cooperate in prey capture, and obtain a higher overall success rate (Lamprecht 1978). They have been recorded as taking adult antelope in the Serengeti (Van Lawick and Van Lawick Goodall 1970). Small mammalian prey are caught in a manner similar to that of the golden jackal, through good

hearing and a leap followed by an accurate pounce. They are nocturnal and/or crepuscular, but activity periods commonly extend into the day (Kingdon 1977; Sillero-Zubiri et al. 2004).

A monogamous mated pair forms the basic social structure, and the pair bond appears to be life-long in most cases (Moehlman 1978, 1979, Estes 1991). The species is territorial and uses faeces and urine to demarcate territorial boundaries (Sillero-Zubiri et al. 2004). Territories are stable and intruders are aggressively expelled, although water sources may be shared. Density and group size are variable depending on food and its distribution, and hence home range sizes are highly variable, ranging from 1-18 km^2 (Sillero-Zubiri et al. 2004). In the rift valley in Kenya home ranges have been recorded as 1.8km^2, ranging between 0.7-3.5km^2 (Fuller et al. 1989).

Mortality and reproduction

In Southern Africa there is a distinct breeding season, and it is likely that this is also the case in Tanzania. Pups are born in underground dens, which often have multiple entrances, and which may be used over several years. Litter size ranges between 1 and 6 in Tanzania. Pups first emerge from the den at 3 weeks and are weaned at 8-9 weeks to become completely independent of the den at 14 weeks (Moehlman 1978). Both parents and helpers from previous litters may help provision and guard new pups, and the presence of these helpers result in higher pup survival (Moehlman 1986). Pups reach sexual maturity at 11 months and can disperse huge distances – more than 100km has been recorded (Sillero-Zubiri et al. 2004).

Black-backed jackals compete with many other carnivores; however their generalist habitats help to avoid intense competition. They often scavenge off of kills of other predators, such as lion, leopard, spotted hyaena, wild dog and cheetah (Wyman 1967). They coexist with the other two species of jackal – golden and side striped, probably through resource partitioning, but are thought to displace side-striped jackals from grassland habitat, despite their smaller size, due to higher levels of aggression (Sillero-Zubiri et al. 2004). Spotted hyaenas, leopards and cheetahs have been observed to kill and eat black backed jackals. It is likely they are vulnerable to other large carnivores in the ecosystem (Sillero-Zubiri et al. 2004). Their propensity to scavenge makes them vulnerable to poisoned bait outside of protected areas. They are commonly killed on roads, possibly due to scavenging road kills. They are vulnerable to canid diseases, such as rabies and distemper, and skin diseases such as mange and ticks and fleas. The maximum lifespan in the wild is thought to be 10-12 years (Haltenorth and Diller 1980).

Distribution and habitat

The species is found in a wide variety of habitats including arid coastal desert, montane grassland, arid savannah and scrubland, open savannah, woodland savannah mosaics and farm land. They have been recorded at altitudes higher than 3000m. In general black backed jackals show a preference for open habitats and tend to avoid dense vegetation (Pienaar 1969). Where more than one jackals species occur in sympatry the trend is for black backed jackals to use the open grasslands when sympatric with side striped jackal or wooded savannah when sympatric with golden and side-striped jackals. The species has a disjunct distribution range, and is found in two separate populations, one in East Africa, the other in southern Africa (Sillero-Zubiri et al. 2004). Tanzania holds only the east Africa population, and the published distribution occurs in the north – central area in a triangle coming down from the Serengeti and Mkomazi, narrowing to a point in the vicinity of Rungwe Game Reserve. It has not been recorded as occurring outside this area. The records contributed to the Tanzania Carnivore Atlas appear to be more widespread than this distribution, with a number of reliable sightings outside this area.

A recent survey in the south plains of the Serengeti National Park estimates black backed jackal numbers to be 135 across 2379 km^2. This survey area was largely over the southern grasslands, which is not optimal habitat for black backed jackal, elsewhere densities have been recorded as around 0.4 jackals/km^2 (Rowe–Rowe 1982), and much higher densities have been recorded around food rich seal rookeries reaching a maximum of 16-32/km^2 (Sillero-Zubiri et al. 2004). However, the Serengeti plains estimate is the only estimate of abundance or density for the species in Tanzania.

Northern region - Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi
There are many records of the species from from all across the Serengeti National Park. There are also records from Grumeti and Ikorongo Game Reserves, and some records from the south east of Maswa Game Reserve. There are many records from all across Ngorongoro Conservation Area. There are fewer records outside the protected areas, however there are records to the west and south of Lake Natron, and there are many records of the species in and around Arusha National Park and a single record from Kilimanjaro National Park. There is also a single record from Mkomazi Game Reserve and a number of records south of Arusha. Finally, there is a single record of the species outside the western border of Serengeti National Park close to Lake Victoria.
Maasai steppe - Tarangire, Manyara, Simanjiro, Mkungunero.
The species has been recorded in Manyara and Tarangire National Parks, particularly the northern sector of Tarangire. There are also records to the south of Lake Eyasi and from the south of Lake Manyara. There are historical records from Mbulu and Babati districts (Swynerton 1951).
North west and central region - Ugalla, Mahale, Minziro, Bukoba, Rubondo, Singida, Dodoma, Tabora, Moyowosi/Kigosi.
The species has been recorded in Moyowosi Game Reserve and Mahale National Park. There are records of the species being killed by tourist hunters in Burigi and Ugalla Game Reserves (Caro et al. 1998b) and occurring in Gombe and Rubondo Island National Parks (McColaugh 1989). There are also historical records from Tabora and Ugalla Game Reserves (Swynerton 1951).
Rukwa-Lukwati - includes Katavi, Ruaha, Rungwa, Lwafi
The species has been recorded in Katavi and Ruaha National Parks, and Muhesi Game Reserve. The southern highlands project reports the species as occurring in southern Tanganyika, including the Rukwa region.
Selous-Niassa - includes Mikumi, Lindi
The species has been recorded in Mikumi National Park. There are no records for Selous Game Reserve; however there are published records of 16 individuals being killed by tourist hunters in the game reserve (Caro 1998a?). There is a historical record from Selous (Swynerton 1951).
Coast - includes Mtwara, Zanzibar and Saadani
There are no records of the species from this region except for a single observation near the coast midway between Dar es Salaam and Lindi
Southern highlands - includes Mbeya, Rungwe, Kitulo, Mpanga/Kipengere
There are no records of the species from this region. There are historical records from Njombe district (Swynerton 1951).
Eastern Arc Mountains - includes Usambaras, Uluguru, Udzungwa
The species has been recorded to the north east of Iringa, close to the Udzungwa Mountains National Park, the southern highlands project also list the species as being likely to occur in this region. There are historical records from Morogoro region (Swynerton 1951; Ulanga district: Lamprey 1963).

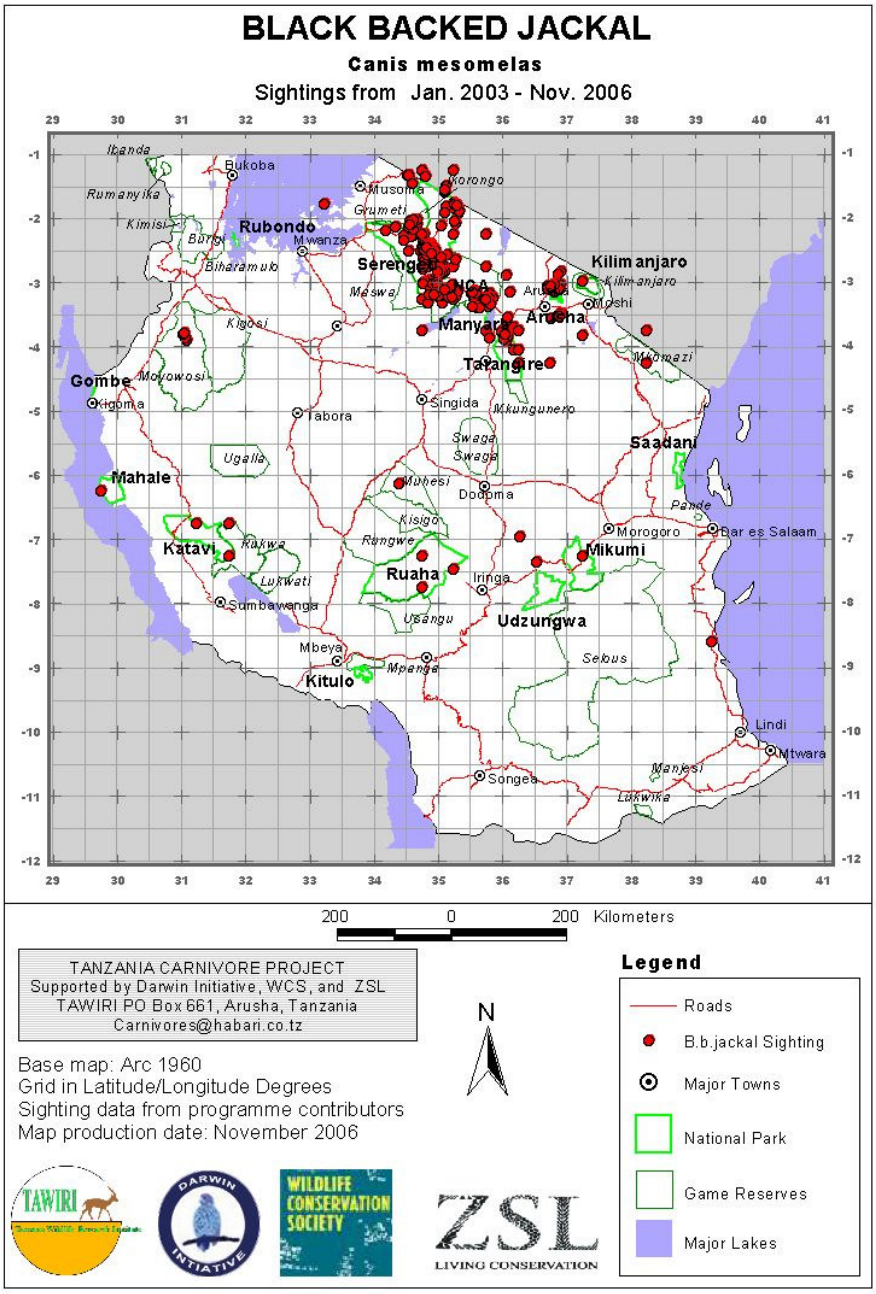

Fig. 21 Map of known sightings of the black backed jackal submitted to the Tanzania Carnivore Project since 2002 up until the time of the workshop. Data submitted are in two forms, either as direct GPS locations, or as a grid square as identified on the map. The former data type are plotted on the map directly, whilst the latter data type are plotted at the centre of the reported grid square.

4.11 Side-striped jackal: Summary of current knowledge

Fig. 22 Side-striped jackal

Scientific name: *Canis adustus*
Names in use in Tanzania: Side-striped jackal (English), Bweha (Kiswahili)
CITES: Not listed.
IUCN Red list: Least concern (2004), population trends stable.

Physical description
The side-striped jackal is overall grey or buff grey in colour, with a white or buff side stripe on its side running from the shoulder to the top of the hip with a black lower margin, and a diagnostic white tip to the tail. None of the other species of jackal in Tanzania have a white tipped tail. It is the largest jackal in Tanzania, and males are slightly larger than females. In Zimbabwe mean body mass is 9.4(7.3-12.0)kg for males and 9.3(7.3-10.0)kg for females (Smithers 1983), head and body length in east Africa ranges from 65-81cm, and tail length 30-41cm (Kingdon 1977). The dental formula is 3/3-1/1-4/4-2/3=42. A varying number of subspecies are listed, however differences may not warrant a subspecies designation (Kingdon 1997). The species has a wide vocal repertoire, including a bark, growls, yaps, cackles, whines, screams, a croaking distress call and a hooting howl (Sillero-Zubiri et al. 2004).

Ecology
Side-striped jackals occupy a wide range of habitats, from farmland to towns, through wooded, grass and bush savannahs, marshes and mountains up to 2,700m (Sillero-Zubiri et al. 2004). They tend not to occur in thick forest. In areas with sympatry with the other two jackal species the side-striped usually occupies areas of denser vegetation while black backed and golden jackals dominate more open habitats (Sillero-Zubiri et al. 2004). The species is omnivorous, and their diet varies according to seasonal and local availability. They have been recording as eating wild fruit, small to medium sized mammals, birds, invertebrates, cattle cake, grass, garbage and carrion (Sillero-Zubiri et al. 2004). There is very little evidence that they depredate livestock to a great extent.

The species forages solitarily, however family groups are occasionally observed. Despite often being seen on their own, the species can occur in pairs and in family groups of up to seven individuals (Sillero-Zubiri et al. 2004). The basis of the family group is the mated pair, which is known to have been stable over several years. Annual home range size has been recorded in Zimbabwe as around 12km^2, although there is great seasonal variation in the spatial use of home range (Sillero-Zubiri et al. 2004). Home ranges can overlap, by as much as 33% (Sillero-Zubiri et al. 2004). They are primarily nocturnal.

Mortality and reproduction
In southern Africa there is a distinct breeding season (Sillero-Zubiri et al. 2004), and it is likely that this is also the case in Tanzania, although there is little published information (Kingdon 1977). Gestation is 60 days, and litter size ranges between 4-6 pups (Skinner and Smithers 1990). Pup mortality is thought to be high (Sillero-Zubiri et al. 2004). Pups are born in underground dens, often in abandoned aardvark holes or excavated termitaria (Skinner and Smithers 1990). The den chamber is 0.75-1m below the surface and 2-3m from the entrance. After weaning both parents assist in rearing young, bringing food to the den throughout the night (Sillero-Zubiri et al. 2004). There is some evidence that alloparental care of young occurs in this species, as with other jackal species (Moehlman 1989).

Side-striped jackals are predated by leopards (Sillero-Zubiri et al. 2004). They are also persecuted or snared in areas of high human density, and are vulnerable to being killed on the roads (Kingdon 1977). They are vulnerable to canid diseases, including rabies, distemper, tick feer and mange, for all of which they are known or suspected reservoirs and vectors for domestic dog infection (Sillero-Zubiri et al. 2004). Maximum longevity is thought to be 12 years (Haltenorth and Diller 1980).

Distribution and habitat

The species is found in a wide variety of habitats including savannah and scrubland, woodlands, urban and human modified environments, marshes and mountain habitats up to 2,700m (Sillero-Zubiri et al. 2004). They tend not to be found in thick forest, but can be found on forest edges and glades (Kingdon 1977). They prefer moister habitats than the other species. Densities have been estimated as ranging from 0.07/km^2 in the Sahel, to 0.5-0.8/km^2 in western Zimbabwe to 1/km^2 in commercial farmland in Zimbabwe (Sillero-Zubiri et al. 2004). The only density estimate in Tanzania is 0.5(+/-0.31)/km^2 in the Serengeti National Park (McColaugh 1989). The species is thought to be widespread across the country.

Northern region - Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi

There are many records of the species from all across the Serengeti National Park. There are also records from Grumeti Game Reserve, however there are no records from Ikorongo or Maswa Game Reserves. There are many records from all across Ngorongoro Conservation Area, but save for a single record from the highlands, most records are from the boundary between the Serengeti and Ngorongoro. There are no records elsewhere in the region, although there are published records of the species in Kilmanjaro National Park (McColaugh 1989, Rees 1964, Grimshaw and Foley 1990) and Arusha (Vesey-FitzGerald 1964).

Maasai steppe - Tarangire, Manyara, Simanjiro, Mkungunero.

There are no records of the species across this region. It may be that it is displaced in this relatively arid area by the black backed jackal, which is likely to be dominant here. Interestingly, in the published literature Cheffings (1979) states that the species is commonly sighted in Tarangire National Park, which suggests that there may have been changes in the ecology of the area since this time. There are historical records of the species in Lake Manyara National Park (Swynerton 1951).

North west and central region - Ugalla, Mahale, Minziro, Bukoba, Rubondo, Singida, Dodoma, Tabora, Moyowosi/Kigosi.

The species has been recorded in Moyowosi Game Reserve and Mahale National Park. There are historical records of the species in Dodoma (Swynerton 1951) and a more recent published record from Ugalla Game Reserve (McColaugh 1989).

Rukwa-Lukwati - includes Katavi, Ruaha, Rungwa, Lwafi

The species has been recorded in Katavi and Ruaha National Parks, and Muhesi and Rukwa Game Reserves. The southern highlands project reports the species as common and widely distributed across the area.

Selous-Niassa - includes Mikumi, Lindi

The species has been recorded in the Selous Game Reserve and there are a number of records from the Selous-Niassa corridor close to the border with Mozambique. There are also published records of the species in the Matadi area of the Selous Game Reserve (Kaswamila et al. 2003).

Coast - includes Mtwara, Zanzibar and Saadani

There are a number of records of the species from this region between Dar es Salaam and Lindi, and McColaugh (1989) notes it as being widespread in the Lindi and Ruawa plateau area.

Southern highlands - includes Mbeya, Rungwe, Kitulo, Mpanga/Kipengere

There is a single record from this area south of Lake Rukwa, however the southern highlands project lists the species as relatively common in the region up to 2,800m. There are historical records for Mbeya and Songea (Swynerton 1951).

Eastern arc mountains - includes Usambaras, Uluguru, Udzungwa

The species has been recorded close to Iringa, and the southern highlands project lists the species as relatively common in the Udzungwas.

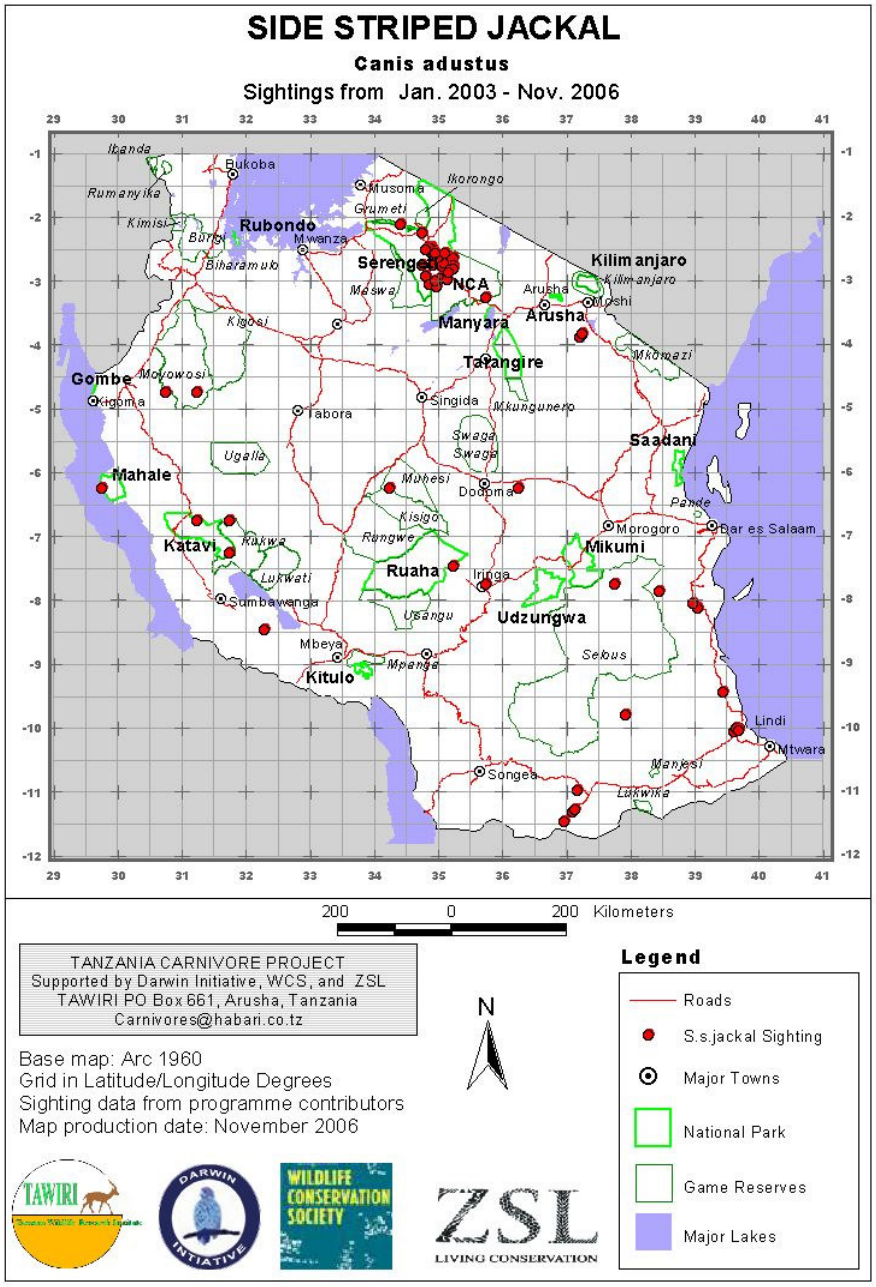

Fig. 23 Map of known sightings of the black backed jackal submitted to the Tanzania Carnivore Project since 2002 up until the time of the workshop. Data submitted are in two forms, either as direct GPS locations, or as a grid square as identified on the map. The former data type are plotted on the map directly, whilst the latter data type are plotted at the centre of the reported grid square.

4.12 Bat-eared fox: Summary of current knowledge

Fig. 24 Bat-eared fox

Scientific name: *Octocyon megalotis*
Names in use in Tanzania: Bat-eared fox (English), Kipara (Kichagga)
CITES: Not listed.
IUCN Red list: Least concern (2004), population trends unknown.

Physical description
The bat-eared fox is a small canid with slim legs, a long bushy tail, and large bat-like ears, from which it derives its name. The back of the ears, front part of the sout, face mask, front and lower part of the back legs and the mid-dorsal part of the tail are all back, whilst a whitish band extends from across the forehead to below and up the first three quarters of the frontal rim of the ears. Beige to honey coloured fur extends across the throat chest and under parts. The fur tends to be paler in older individuals. The fur is thick and soft, with a black base and white tip giving a grizzled appearance. Published weights from southern Africa are 4.0-4.1kg (range 3.4-4.9) for males and 3.9-4.1kg (range 3.2-5.4) for females (Gittleman 1989, Smithers 1971), head to body length 52.9cm (range 46.3-60.7) for males and 53.6cm (range 46.7-60.7) for females, with tail lengts of 29.8cm (range 23.0cm-34.0cm) for males and 30.3cm (range 27.8-34.0cm) for females. There are no published physical data for Tanzania. Bat-eared foxes have 4-5 functional lower molars and 3-4 upper molars yielding a dentition of 3/3-1/1-4/4-3-4/4-5=46-50 – the largest number of teeth for any non-marsupial land mammal. There are two subspecies *O. m. megalotis* in southern Africa and *O. m. virgatus* in east Africa and hence in Tanzania. Vocalisations are mostly soft and sparingly used except when alarmed or excited (Sillero-Zubiri et al. 2004).

Ecology
Bat-eared foxes are more specialist in their diet than the other canids and, in Tanzania, depend on harvester termites and beetles, but their diet is also supplemented by orthopterans, beetle larvae and ants (Sillero-Zubiri et al. 2004). Elsewhere, such as Botswana, they have been recorded as more taking arachnids and seasonal fruit, and they may also eat small mammals, birds and eggs and reptiles, but this has rarely been recorded in East Africa. The diet changes seasonally depending on availability. In the Serengeti dung beetles are the main source of food during the rainy season when termite activity is reduced (Maas 1993). When both dung beetles and termites are scarce, beetle larvae are often dug up from the ground (Maas 1993). Foraging techniques depend on the type of prey, but food is generally detected by sound, making use of the species' large ears, whilst walking slowly. In East Africa bat-eared foxes conduct most foraging activity at night, whereas the species can be almost exclusively diurnal in southern Africa in winter. When

foraging, the group communicates through a low whistle to call each other to rich food sources. There is no evidence of any predation on livestock or game; however the species is sometimes attracted to carcasses to feed on fly larvae.

Whilst a monogamous mated pair forms the basic social structure for this species in Southern Africa, in East Africa bat-eared foxes live in stable family groups consisting of a male and up to three closely related females with cubs (Maas 1993; Waser 1980). Such females are often mothers and daughters, all of which may breed. Females bonded with a male retain that bond over their lifetimes. In the Serengeti average group size is 2.44 (+/-0.1; n=18) which increases to 6 (+/-; n=18) prior to dispersal of pups (Maas 1993). Home range size varies from 1km^2 to more than 3km^2. In East Africa home ranges can overlap (Malcolm 1986), but can also be defended as territories through patrolling and scentmarking if they are centred on important harvester termite colonies (Maas 1993). Frequent and extended allogrooming helps to strengthen group cohesion.

Bat-eared foxes are sympatric with several other small, medium and large carnivore species. They have been recorded as attacking, mobbing and displacing competitors including cape foxes, aardvarks, aardwolves, black backed jackals, and even hyaenas and cheetahs. There are components of their diet that overlap with other species, but the rank order of particular prey in their diet differs between species.

Mortality and reproduction

Bat-eared foxes reach sexual maturity at 8-9 months. They have one litter per year with births occurring from October to December (Maas 1993) after a gestation of 60-75 days (Sillero-Zubiri et al. 2004). Litter size ranges from 1-6 cubs, averaging 2.56 in the Serengeti (n=90) (Maas 1993). Cubs are born in underground dens which are either dug by the parents or adapted from dens of other mammals. They may have several entrances and tunnels can be up to 3m long (Sillero-Zubiri et al. 2004). Cubs first emerge when they are 8-12 days old and can be moved between dens. The males are involved with the cubs, spending more time than the females guarding them against predators and taking them out on their first foraging missions. This high level of male parental care enables females to maximise their foraging time and hence provide milk for the cubs. In the Serengeti polygyny, communal breeding and indiscriminate allo-suckling is common, and the number of cubs emerging from the den is inversely related to the number of breeding females. They have been recorded as living up to 13 years in captivity (Sillero-Zubiri et al. 2004).

Causes of mortality include lack of food, resulting in starvation. Predation is also a factor, and predators include spotted hyaena, martial eagle, spotted eagle owl, Verraux's eagle owl, rock python, cheetah, wild dog and leopard (Sillero-Zubiri et al. 2004). Pups can also be predated by black backed jackal (Sillero-Zubiri et al. 2004). In southern Africa they may be persecuted by people mistake, due to their habit of feeding on fly larvae in carcasses, which can lead people to regard them as responsible for livestock death. They are hunted and trapped for fur in the colder months by indigenous people in southern Africa, particularly in Botswana. Road kills are common. Disease is thought to have an impact on populations, and rabies and canine distemper can cause drastic declines in the populations in Tanzania (Maas 1993; Roelke-Parker et al. 1996). Both these diseases have been linked to reservoirs in domestic dogs (Carpenter et al. 1998; Cleaveland & Dye 1995). In the Serengeti 90.4% of documented mortality was due to disease, with an additional 3.2% to predation, and 3.2% due to road accidents (n=94) (Sillero-Zubiri et al. 2004). Trichinellosis has been found in one Fox and Canine parvovirus also isolated, but their effects are unknown (Sillero-Zubiri et al. 2004).

Distribution and habitat

Bat-eared foxes occur across the arid and semi-arid regions of eastern and southern Africa in two discrete populations, representing each of the subspecies, and separated by 100km, through much of Zambia. The East African population covers the southeastern corner of Sudan, the southern half of Ethiopia, most of Somalia except the far North, Northern Uganda, most of Kenya except the southeastern corner, Northern Zambia and Northern Malawi. The species is thought to occur across much of Tanzania, but is excluded from a band of around 400km from the north western

boundary and the southern boundary. The range overlaps almost completely with that of Hodotermes and Microhodotermes (Sillero-Zubiri et al. 2004). The disjunct nature of the distribution is similar to another termite dependents species, the aardwolf, as well as a non-termite dependent species, the black backed jackal. The species is common in conservation areas in Southern and Eastern Africa, and is uncommon on farms in South Africa where they are occasionally persecuted. Numbers fluctuate depending on rainfall, food, breeding stage and disease. Published density estimates in Tanzania are 0.3-1.0/km^2 in the Serengeti (Hendrichs 1972), and between 0-0.33/km^2 in 2002, 2003 and 2005 (Durant et al. unpublished data). In Southern Africa densities vary from 0.3-14/km^2 (Sillero-Zubiri et al. 2004). In the Serengeti they are common in open grassland and woodland boundaries, but not on the short-grass plains (Malcolm 1986).

Northern region - Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi

There are many records of the species from the grassland areas in the southern Serengeti National Park. Abundance of this species is available for this area from the Serengeti Carnivore Census, and has been estimated as ranging between 0.00-0.33/km^2 in 2002, 2003 and 2005 (Durant et al. unpublished data). There are records from Grumeti or Ikorongo Game Reserves, and some records from the south east of Maswa Game Reserve. There are also several records from the Ngorogoro Conservation Area, particularly on the western boundary. There are fewer records outside the protected areas, however there is a record to the west of Lake Natron, and there are records of the species in and around Arusha National Park and a single record in western Kilimanjaro close to the Kenya border. There are no records from Mkiomazi Game Reserve or from within Kilimanjaro National Park. There are a couple of records of the species outside the park to the west, close to the Kenya border, midway between the park boundary and Lake Victoria but these were sent in by a non resident of Tanzania and are not verified by other observers. There are published records of the species in Mkomazi Game Reserve (Eltringham et al. undated).

Maasai steppe - Tarangire, Manyara, Simanjiro, Mkungunero.

Records of the species are widespread across Tarangire National Park. There are no records from within Manyara National Park, but there are records from just outside the park to the east and to the south of the lake. Outside the protected areas there are records from Siminjiro to the east and south east of Tarangire National Park, and to the west of the park towards Singida. There are historical records of the species in Lake Manyara National Park (Swynerton 1951) and more recently by Prins (1987).

North west and central region - Ugalla, Mahale, Minziro, Bukoba, Rubondo, Singida, Dodoma, Tabora, Moyowosi/Kigosi.

The species has been recorded in Moyowosi and Ugalla Game Reserves and Mahale National Park. There is one record of the species outside of the protected areas in this region to the east of Ugalla.

Rukwa-Lukwati - includes Katavi, Ruaha, Rungwa, Lwafi

The species has been recorded in Ruaha National Park, but there are no records of the species elsewhere in this region. The southern highlands project report the species as occurring in similar areas to the black backed jackal, including Ruaha and southern Tanganyika, andthe rukwa region.

Selous-Niassa - includes Mikumi, Lindi

The species has been recorded in Mikumi National Park.

Coast - includes Mtwara, Zanzibar and Saadani

There are no records of the species from this region except for a single observation near the coast a third of the way between Dar es Salaam and Lindi.

Southern highlands - includes Mbeya, Rungwe, Kitulo, Mpanga/Kipengere

There are no records of the species from this region. There is a historical record from Mbeya district (Swynerton 1951).

Eastern arc mountains - includes Usambaras, Uluguru, Udzungwa

The Tanzania Carnivore Atlas project has no records of the species in this region, however the southern highlands project lists the species as having a similar distribution to the black-backed jackal in this region, i.e. likely to occur in the vicinity of Iringa and in the northern part of the

Udzungwa Mountains National Park. There are historical records of the species in the vicinity of Same, close to the Pare Mountains (Swynerton 1951).

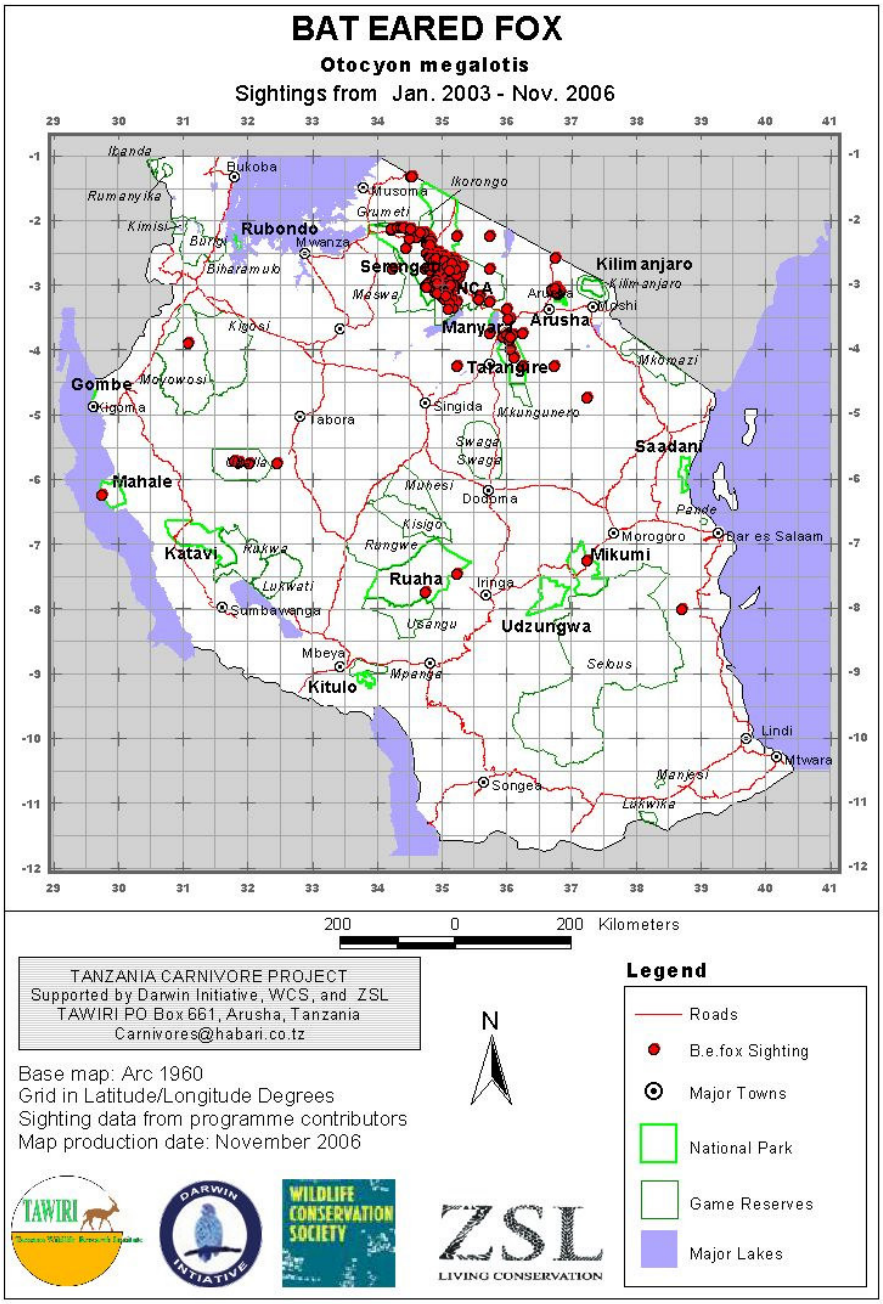

Fig. 25 Map of known sightings of the bat eared fox submitted to the Tanzania Carnivore Project since 2002 up until the time of the workshop. Data submitted are in two forms, either as direct GPS locations, or as a grid square as identified on the map. The former data type are plotted on the map directly, whilst the latter data type are plotted at the centre of the reported grid square.

4.13 African civet: Summary of current knowledge

Insert photo from camera trap records – Fig. 26

Scientific name: *Civettictis civetta*
Names in use in Tanzania: Bat eared fox (English), Kipara (Kichagga)
CITES: Appendix III/w. 2006 quota for Tanzania 200 live animals.
IUCN Red list: Least concern (1996), population trends not listed.

Physical description
The African civet is the largest African viverrid. It has large hindquarters, a dark facial mask and white neck stripes, and has a distinctive spotted coat (Ray 1995). The species also has an erectile

dorsal crest, which is erected when alarmed, and a bushy tail which is laterally flattened and pointed at the end. It has long non-retractile claws, and although it has five digits on each foot the fifth is set back and does not appear in spoor (Ray 1995). The coat patterns is extremely variable, the dorsal ground colour of the fur varies from near white to creamy yellow to reddish buff and is covered by deep brown to black spots of blotches. The patterning is irregular and not arranged in regular longitudinal lines, as in genets. The tail is generally black on the dorsal surface and is marked by around five partial but diffuse rings of white, the paws and lower limbs are generally back (Kingdon 1977). Melanism has been recorded in West Africa and Central Africa but not in Southern Africa.

In East Africa weight averages 12kg, with a range of 7-20kg (Kingdon 1977), a head and body length of 67-84cm, and tail length of 34-46.9cm (Ray 1995). There appears to be no geographical variation in size. There are 5 subspecies described, however there is considerable doubt as to their taxonomic validity (Ray 1995), however one of these subspecies, *C. c. schwarzi*, is restricted to Zanzibar. The dental formula is 3/3-1/1-4/4-2/2=40. Civets are largely silent, however they have a contact call which is a short repetitive sound usually delivered three or four times in succession with as many as seven notes in a sequence. It is most frequently heard when cubs are contacting littermates, and occasionally used by adults to contact conspecifics.

Ecology

African civets live in both forest and open country, but they require some cover to provide a refuge during the day, as they are predominantly nocturnal (Kingdon 1977). The species is absent from the more arid areas of Africa such as the Sahara and Eritrea, but can be found along river systems that project into otherwise arid areas (Rosevear 1974). They have been seen at a wide range of altitudes from sea level to as high as 5,000m on Kilimanjaro (Moreau 1944).

The species is omnivorous and eats a wide variety of foods. Most information comes from Southern Africa, where diets are comprised of wild fruit, carrion, rodents, insects, particularly crickets, grasshoppers, termites, beetles and stick insects, birds, reptiles, molluscs, amphibians, arachnids and vegetation (Ray 1995). Millipedes are also eaten in some areas (Randall 1977). In East Africa the diet seems to be similar, but aquatic organisms also feature – such as crabs snails and mudskpippers and the eggs of ground-nesting birds (Kingdon 1977). The species has a reputation for raiding cultivated gardens and chicken coops at night (Kingdon 1977). Food is detected predominantly by smell and sound (Ewer and Wemmer 1974) and prey is seized by the mouth, not the paws. With large prey the first bite is directed at the skull, smaller prey can be seized in any way (Ewer and Wemmer 1974). They can attack prey up to the size of a hare (Astley Maberly 1955). Aquatic prey is caught under water as the species is a good swimmer. They can eat as much as 2kg in a night (Kingdon 1977). Civets often live near human settlements returning regularly to a steady source of food from households (Kingdon 1977).

African civets use defecation sites called latrines or civetries (Bearder and Randall 1978; Kingdon 1977). Anal glad secretions are added to the dung to produce a long-lasting odour. Latrines are primarily situated alongside roads or game trails that are also used as routes for movement (Bearder and Randall 1978). They are located in clearings, often in shallow hollows or depressions. In Southern Africa individuals visit more than one latrine and a specific latrine will be used by more than one African civet (Randall 1977). Civets also mark objects along established routes with perineal gland secretions (Kingdon 1977). Foreign objects are also marked.

In captivity African civets are not monogamous (Mallinson 1973) and it is likely that bonds between mated pairs in the wild are not maintained (Kingdon 1977). Females are overtly hostile towards males immediately after the birth of their cubs in captivity. However the social system in the wild is poorly known.

Mortality and reproduction

Civets are thought to have a breeding season in Kenya and Tanzania between March and October (Haltenorth and Diller 1980), but in other parts of their range there is no distinct breeding season.

In captivity females attain sexual maturity at 1 year of age and males a little bit earlier – from 9 months to a year (Ewer and Wemmer 1974). Gestation is 60-81 days (Kingdon 1977) and hence in captivity civets can produce their first litter at around 14 months of age. Females are polyestrous and are able to have two or three litters per year. Litter size in captivity varies from 1-4 (Ray 1995). Compared to most carnivores, young are born in an advanced state, furred, with eyes open within a few days of birth and able to crawl (Ewer and Wemmer 1974, Kingdon 1977; Mallinson 1973). There is little information on wild civet cubs, however in captivity the young start to explore outside their nest at 17-18 days. In the wild cubs are kept in a nest when they are first born, which consists of holes made by other animals or cavities under tangled roots (Kingdon 1977). These nests are readily vacated if the animal is disturbed. The cubs are completely dependent on their mother's milk for up to 6 weeks, and start to eat solid food during their 2nd month of age. Weaning occurs between 14-16 weeks (Ewer and Wemmer 1974).

Civets may be attacked and killed by dogs, particularly as they are often attracted to households when foraging for household waste. They may also be killed by humans, both for their meat, but also in retaliation for raiding garens and chicken coops (Kingdon 1977). Some cultures have taboos about eating civet meat. Rabies has been recorded in wild civets in West Africa, and the species may act as a reservoir for the disease (Enurah et al. 1988). Up until last century, civets were kept for their perineal gland secreton, which was used for perfume and as a medicine to treat a variety of aliments. Synthetic musk has now been developed, but this has not fully replaced natural civet, nearly all of which is exported from Ethiopa (Dannefeldt 1985). They have been recorded as living up to 14 years in captivity (Mallinson 1973).

Distribution and habitat

African civets occur in a band through sub-Saharan African between 15N to 24S latitude. Within this latitude they occur across a wide variety of habitats ranging from semi arid savannahs to dense rainforest. They occur in Zanzibar but are absent from other islands, including Madagascar. They are thought to occur all across Tanzania, and the data from the carnivore atlas project seem to confirm this. There is no information on their density of abundance in any part of their range.

Northern region - Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi

There are several records of the species from the Serengeti, particularly from the centre of the park and the western corridor, as well as the Ndutu area. Density in the Serengeti National Park has been estimated as less than 0.1 individuals/km^2 (Waser 1980). There are also a few records from the eastern Ngorongoro Conservation Area. There are records from Grumeti Game Reserve, but not ffrom Ikorongo or Maswa Game Reserves and no records from the stretch of arid savannah from Serengeti to Kilimamjaro. There are, however, records from Kilimanjaro and Arusha National Parks, and from the main road just south of Mkomazi Game Reserve. The species is listed as being present in Mkomazi Game Reserve (Eltringham et al. undated). There is also a published record of the species in Kilambeni village forest (Cordeiro et al. 2005).

Maasai steppe - Tarangire, Manyara, Simanjiro, Mkungunero.

The species has been recorded in Tarangire National Park (including one camera trap record in a 1169 camera trap day survey), and from Simanjiro, to the east of the park. There is also a single record of the species to the west of Eyasi and south of the Maswa Game Reserve.

North West and Central region - Ugalla, Mahale, Minziro, Bukoba, Rubondo, Singida, Dodoma, Tabora, Moyowosi/Kigosi.

The species has been recorded in Moyowosi Game Reserve, Mahale Mountains National Park and Minziro Forest Reserve (including five camera trap records in a 1,503 camera trap day survey). There are no records outside these areas, except for one record to the southeast of Moyowosi Game Researve about 20km outside the protected area. There are published records of tourist trophies from Ugalla Game Reserve (Caro et al. 1998a?).

Rukwa-Lukwati - includes Katavi, Ruaha, Rungwa, Lwafi

The species has been recorded in Ruaha and Katavi National Parks and Muhesi, Kisigo, Upangu and Rukwa Game Reserves. It has not been recorded in Lukwati Game Reserve. The Southern

Highlands Project reports the species as occurring in Rukwa Game Reserve and Southern Tanganyika.

Selous-Niassa - includes Mikumi, Lindi

The species has been recorded in Mikumi National Park and the northern and eastern parts of Selous Game Reserve. There are also published records of the species from Kilombero Valley (Starkey 1997).

Coast - includes Mtwara, Zanzibar and Saadani

There are a number of records of the species near between Dar es Salaam and Lindi, as well as a few records close to the main road from Dar es Salaam, around 50-100km from the coast. There are also numerous records from Zanzibar. There are published records of the species in the Mbarawala area around Lindi (Msuya et al. 2004), and, further north from Bombo Forest reserve (Clarke and Dickinson 1995).

Southern highlands - includes Mbeya, Rungwe, Kitulo, Mpanga/Kipengere

The species has been recorded close to Kitulo National Park and the Southern Highlands Project has records of the species in Rungwe Game Reserve.

Eastern Arc Mountains - includes Usambaras, Uluguru, Udzungwa

There are records of the species in the Pare Mountains, and the Udzungwas, including within the Udzungwa Mountains National Park. There are also records from Iringa. The Southern Highlands Project lists the species as being common in the Uzdungwas and present in Iringa and Morogoro regions. There are published records from the east and west Usambara and the Uluguru Mountains (Rodgers and Homewood 1982), and old records from the Ulanga district in Morogoro region (Vesey-FitzGerald 1964).

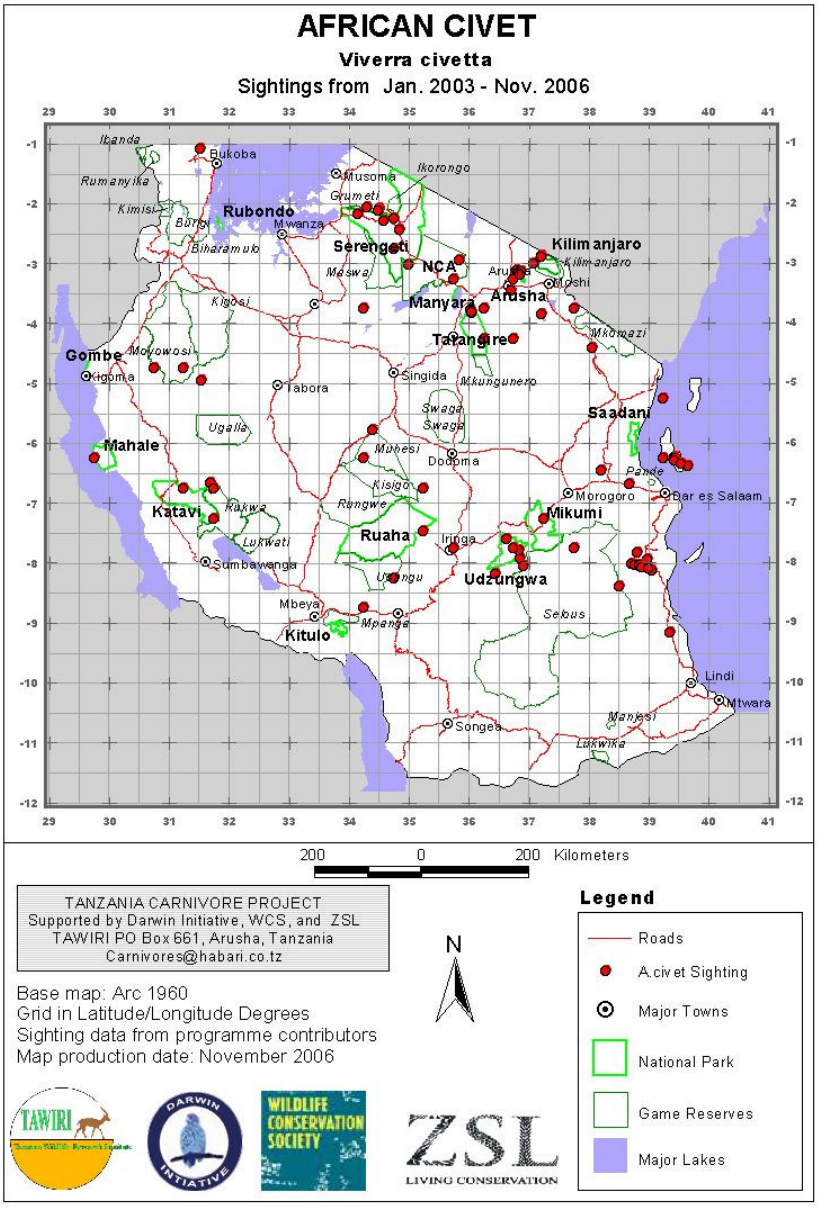

Fig. 27 Map of known sightings of the African civet submitted to the Tanzania Carnivore Project since 2002 up until the time of the workshop. Data submitted are in two forms, either as direct GPS locations, or as a grid square as identified on the map. The former data type are plotted on the map directly, whilst the latter data type are plotted at the centre of the reported grid square.

4.14 Two spotted palm civet: Summary of current knowledge

Insert photo from camera trap – fig 28

Scientific name: *Nandinia binotata*
Names in use in Tanzania: Two spotted or African palm civet (English)
CITES: Not listed.
IUCN Red list: Least concern (1996), population trends not listed.

Physical description
Palm civets are semiarboreal or arboreal viverids. The two spotted palm civet is a uniform olive brown with faint darker spots, but with two cream spots on the shoulders, giving rise to its name. There are five digits on the fore foot and hind foot, each with retractable calws. The inner digits are divergent from the other digits to form clawed thumbs (Kingdon 1977). The weight is on average 2(1.70-2.1)kg, and head to body length 51(45-58)cm, and tail 58(50-62)cm. It has a very distinctive call which can be used to identify it's presence in an area.

Ecology
African palm civets are largely arboreal and so depend on forest habitat. They depend on a mixed omnivorous diet, or sometimes subsist entirely on fruit. Although fruit is mostly the commonest food in east Africa, it can kill quite large prey, including birds and small mammals (Kingdon 1977). It uses scent from glands on its belly, together with dung, urine to leave a trail along the branches over which it travels (Kingdon 1977). It is nocturnal and solitary and appears to be at least partially nomadic (Kingdon 1977). Adult male and female pairs have been seen together, but this is unlikely to be a long lasting bond, as mothers with young have never been reported to be in the company of adult males (Kingdon 1977). They are occasionally attracted in larger groups to fruiting trees. Home range size in Gabon has been documented as averaging 45ha for females and 100ha for males (Charles-Dominique 1978). In this study the palm civets appeared to be territorial, with male territories overlapping a number of female territories. Males drove away other males of the same size, but allowed smaller males to remain inside their territories.

Mortality and reproduction
Little is known about the species. Breeding has been recorded as taking place at Amani between July and August, whilst in Uganda there may be two birth peaks in some areas (Kingdon 1977). In West Africa breeding appears to take place throughout the year (Rosevear 1974). Up to four young are born in a litter, the norm is two, after a 64 day gestation in an arboreal shelter such as a hollow branch (Kingdon 1977). Young become sexually mature in the third year (Charles-Dominique 1978). There is not much information on mortality, although it is known to be hunted in the Dabaga area for meat (De Luca et al. 2006). Maximum longevity in captivity has been recorded as over 15 years (Nowak 2005).

Distribution and habitat

Palm civets are limited to forest habitat and hence occur through the forests of west and central Africa, across southern Uganda and Kenya. Their distribution in Tanzania is thought to be along the boundary to the north and the northwest of the country and then in a band from the north eastern corner to the south western corner, centring around the highlands and the western forest habitats (Kingdon 1977). This band narrows but continues through to Malawi, Mozambique, and the western boundary of Zimbabwe. Published population densities are 5/km^2 in rainforest in Gabon (Charles-Dominique 1978).

The Tanzania Carnivore Atlas project has received only 5 records of the species from across the country, but all are reliable observations.

Northern region - Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi

There no records from this region except from Arusha National Park where it was recorded by the Oikos project. The species was listed as being present in the Serengeti Mara ecosystem in Serengeti II (Sinclair & Arcese 1995), but there are no specific records here, although Kingdon (1977) provides a record of the species in the northern Serengeti around Kogatende, close to the Kenyan border. There are historical and recent records from Kilimanjaro forest (Hollister 1919, Grimshaw et al. 1995).

Maasai steppe - Tarangire, Manyara, Simanjiro, Mkungunero.

There are no records of the species from this region. There is a historical record from Lake Manyara National Park (Kingdon 1977).

North west and central region - Ugalla, Mahale, Minziro, Bukoba, Rubondo, Singida, Dodoma, Tabora, Moyowosi/Kigosi.

Scat from the species has been recorded in Mahale, which is outside the published range for the species, and in Minziro Forest Reserve through a camera trap survey (one sighting in 1,503 camera trap days), which is within the published range. The species has not been recorded anywhere else in this region.

Rukwa-Lukwati - includes Katavi, Ruaha, Rungwa, Lwafi

There is a single record from Daudi Peterson in the Lukima area in Katavi National Park. There are no other records of the species from this region.

Selous-Niassa - includes Mikumi, Lindi

There are no records of the species from this region.

Coast - includes Mtwara, Zanzibar and Saadani

There are no records of the species from this region. There is a published record of the species on Zanzibar Island (Perkin 2004).

Southern highlands - includes Mbeya, Rungwe, Kitulo, Mpanga/Kipengere

There are no records of the species from this region from the Carnivore Atlas Project, however the southern highlands project list it as being present in Mbeya region, Rungwe Game Reserve and the Livingstone Mountains, wherever there are forest patches and sufficient fruit to sustain the species.

Eastern arc mountains - includes Usambaras, Uluguru, Udzungwa

There is a single record of the species from the Udzungwas National Park recorded in a camera trap survey by Francesco Rovero. The southern highlands project list the species as being present in Iringa and Morogoro regions. There are a number of published observations throughout the east and west Usambaras (Cordeiro et al. 2005).

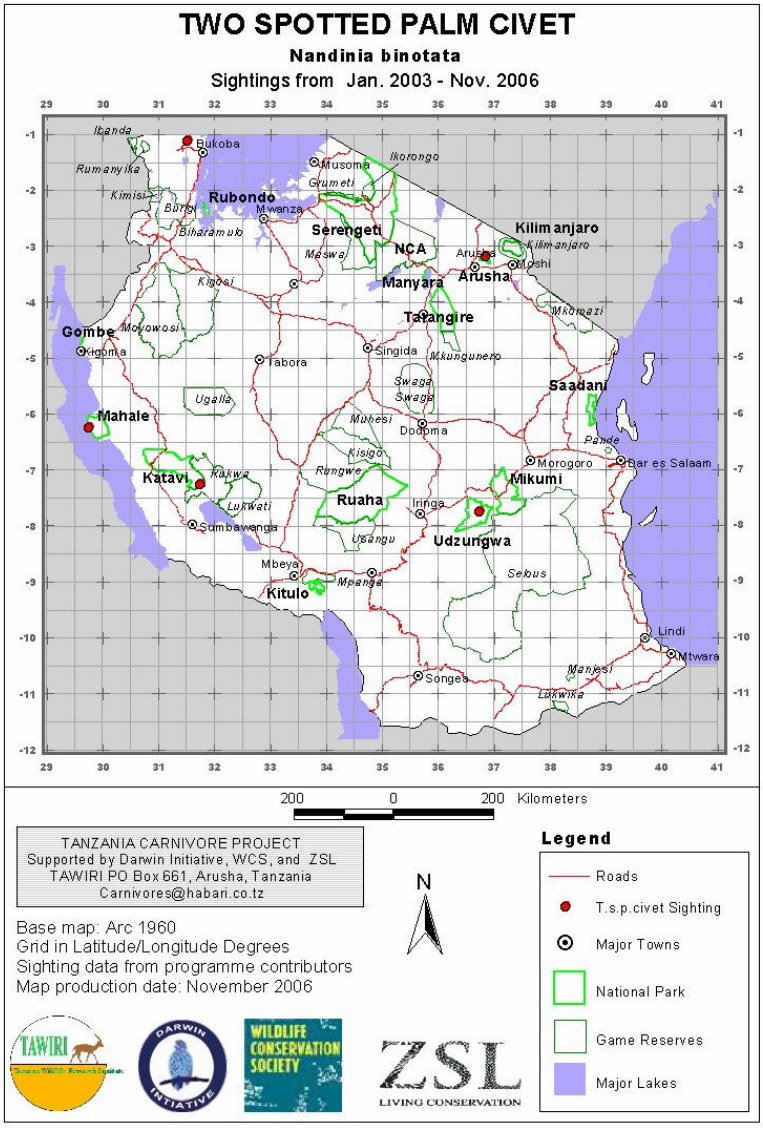

Fig. 29 Map of known sightings of the two spotted palm civet submitted to the Tanzania Carnivore Project since 2002 up until the time of the workshop. Data submitted are in two forms, either as direct GPS locations, or as a grid square as identified on the map. The former data type are plotted on the map directly, whilst the latter data type are plotted at the centre of the reported grid square.

4.15 Common genet: Summary of current knowledge

Fig. 30 Common genet

Scientific name: *Genetta genetta*
Names in use in Tanzania: Common or small spotted genet (English)
CITES: Not listed.
IUCN Red list: Least concern (1996), population trends not listed.

Physical description
The genets in general are easily confused with each other and their taxonomy requires clarification (Gaubert et al. 2004, 2005). All genets are predominantly arboreal with soft fur and retractable

claws. The common genet, or small spotted genet, is often confused with the large spotted genet, or blotched genet. As with all genets, the coat is spotted, with numerous dark brown spots linearly distributed along their length on a sandy background. The ringed tail is almost as long as the body and strongly tapered towards the end. The face has two distinct white patches under the eyes and two indistinct white bnds on the innder side of the eyes running on to the forehead. The chin is white. It weighs between 1.3-2.25kg, and has a head to body length of 40-55cm and tail length of 40-51cm. There are five digits on fore and hind feet, but the fifth digit does not show in spoor. The Dental formula is 3/3-1/1-4/4-2/2.

Ecology

The common genet feeds on small vertebrates (rodents, birds or reptiles), invertebrates and fruits (Kingdon 2004). In Spain radio collared individuals had an average maximum home range size of about 7.8km^2 (Palomares & Delibes 1994), although one adult male wandered across 50km^2 during 5 months (Palomares & Delibes 1988). Home ranges of adult males and females overlapped greatly but those of animals of the same sex were exclusive suggesting territoriality.

Mortality and reproduction

Little is known about the mortality or reproduction for the species. In captivity a pair of common genets produced two litters per year, with a gestation period of 56-77 days, and a litter size of 1-4, although more usually 2-3. They have been documented as living a maximum of 21 years in captivity (Nowak 2005).

Distribution and habitat

The common genet prefers drier habitats compared to the blotched genet, being associated with a wide range of drier habitats, from seasonally arid woodlands to sparsely bushed near-desert, especially rocky areas. It is not water dependent. Their distribution in Tanzania is thought to be across the majority of the country, being excluded only from the far west around Lake Tanganyika, the southern highlands, and to the west of Lake Victoria (Kingdon 2004). The Tanzania carnivore atlas project has received several records of the species from across the country, although some of these records which have no means of verification may be confused with large spotted genet or vice versa, and so they should be interpreted with caution.

Northern region - Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi

The species has been recorded in the Serengeti, particularly in the vicinity of Seronera, where it is seen frequently around houses, and Ndutu, where it is often seen at the lodge. There are also observations from Klein's camp, and from Soitorgoss on the edge of the park. There are a couple of records in Ngorongoro Conservation Area, and to the east of Lake Natron and west of Kilimanjaro, the latter on the Namanga road, and several records in Arusha National Park, including camera trap records. There are no records in Kilimanjaro National Park and Mkomazi Game Reserve, although there are published records of the species occurring in the latter (Eltringham et al. undated).

Maasai steppe - Tarangire, Manyara, Simanjiro, Mkungunero.

The species has been recorded many times in Tarangire National Park in a camera trap survey (35 sightings out of 1,169 camera trap days). It has also been recorded in Manyara National Park, and on Manyara ranch and there are a few records to the east of Tarangire National Park outside the protected area.

North west and central region - Ugalla, Mahale, Minziro, Bukoba, Rubondo, Singida, Dodoma, Tabora, Moyowosi/Kigosi.

The species has been recorded in Mahale Mountains National Park but nowhere else in this region. It was not recorded during an extensive camera trap survey in Minziro Forest Reserve.

Rukwa-Lukwati - includes Katavi, Ruaha, Rungwa, Lwafi

The species has been recorded between Muhesi and Kisigo Game Reserves, and in Ruaha National Park and Katavi National Park, but nowhere else in this region. The Southern Highlands Project lists the species as present in Rukwa Game Reserve.

Selous-Niassa - includes Mikumi, Lindi

The species has been recorded in Mikumi and the north eastern section of the Selous Game Reserve.

Coast - includes Mtwara, Zanzibar and Saadani

There are no records of the species from this region.

Southern highlands - includes Mbeya, Rungwe, Kitulo, Mpanga/Kipengere

There are no records of the species from this region from the Carnivore Atlas, however the southern highlands project list it as being present in Southern Tanganyika.

Eastern Arc Mountains - includes Usambaras, Uluguru, Udzungwa

There are several records of the species from the Udzungwas Mountains National Park recorded in a camera trap surveys. There are also records of the species to the north of the Udzungwas. The Southern Highlands Project lists the species as being present in Iringa and Morogoro regions and also in the Udzungwas. There are published records of the species in Bombo Forest reserve (Clarke and Dickinson 1995).

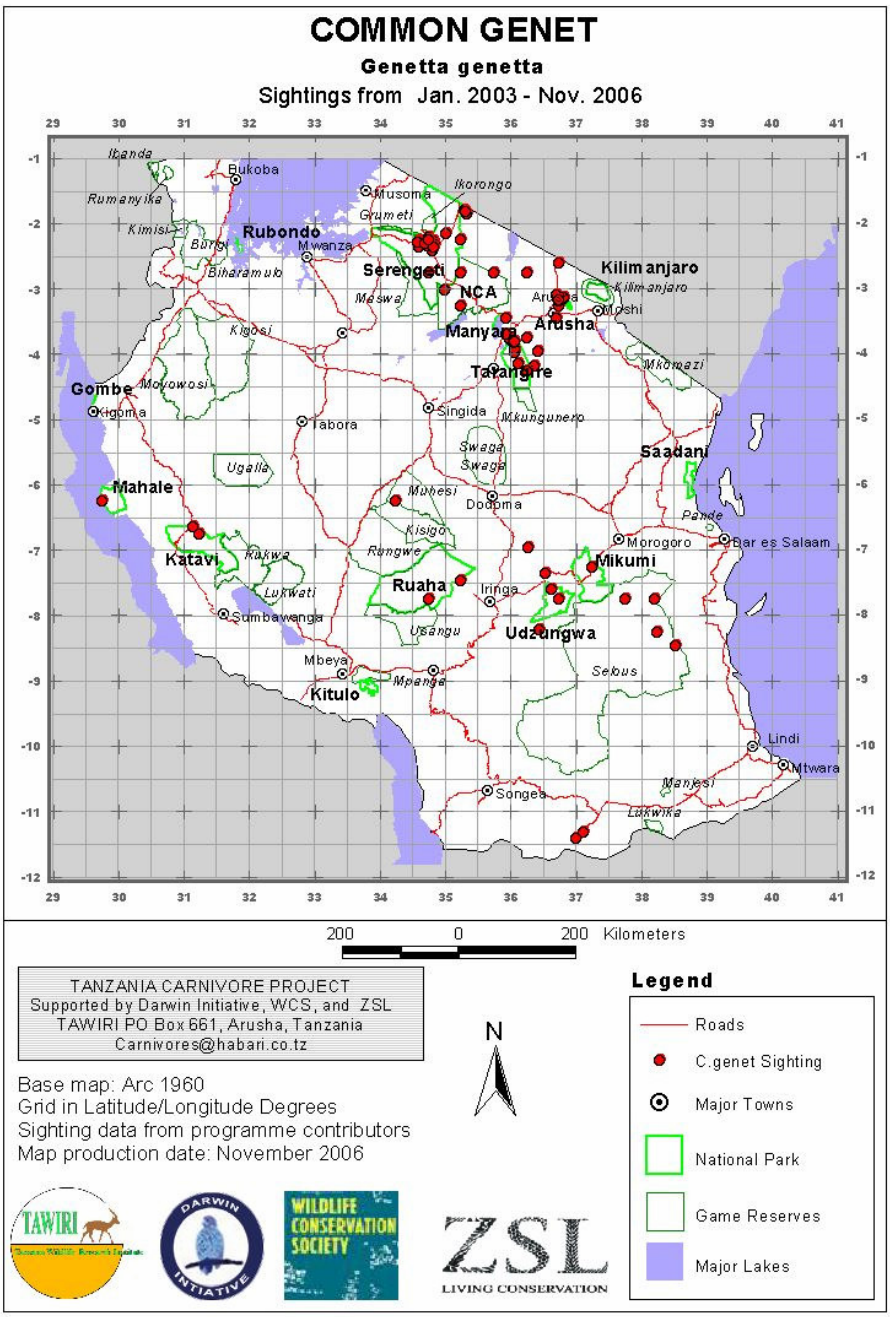

Fig. 31 Map of known sightings of the Common Genet submitted to the Tanzania Carnivore Project since 2002 up until the time of the workshop. Data submitted are in two forms, either as direct GPS locations, or as a grid square as identified on the map. The former data type are plotted on the map directly, whilst the latter data type are plotted at the centre of the reported grid square.

4.16 Large spotted genet: Summary of current knowledge

Insert photo from camera traps - fig. 32

Scientific name: *Genetta maculata*
Names in use in Tanzania: Large spotted genet (English)
CITES: Not listed.
IUCN Red list: Least concern (1996), population trends not listed.

Physical description
The large spotted genet, or blotched genet is often confused with the common genet. As with all genets the coat sandy and spotted, but the spots are larger than those found on the common genet, varying from almost black, to a rusty colour. The tail is banded with 8 or 9 light bands, and almost without exception black tipped, unlike the common genet which is white tipped. Two dark bands arise from the back of the head and swing downwards over the shoulders where they usually break up into spots or bars, and two further less distinct bars arise from the back of the neck between the outer bars. The face has less distinct white bars than the common genet, and a black chin. It weighs between 1.2-3.1kg, and has a head to body length of 40-55cm and tail length of 40-54cm (Kingdon 2004). There are five digits on fore and hind feet, but the fifth digit does not show in spoor, and the spoor is indistinguishable from that of the common genet (Skinner and Smithers 1990). The dental formula is 3/3-1/1-4/4-2/2=40.

Ecology
The large spotted genet feeds on small vertebrates (rodents, birds or reptiles), invertebrates and fruits, tending to concentrate more on invertebrates and fruits and less on vertebrates than the common genet (Kingdon 2004). In Kenya radio collared individuals suggest an average home range size of about 5.9km^2 for males (n=3) and 2.8km^2 for females (n=2) (Fuller et al. 1990).

Mortality and reproduction
Little is known about the species. A sample of 128 dead females showed an average of 2.9 (range 2-5) foetuses (Skinner and Smithers 1990). In Zimbabwe litters have been recorded in hollow trees, in piles of loose boulders and in a house roof.

Distribution and habitat
The large spotted genet prefers moister habitats to that of the common genet, but there is some overlap in the range of the species. It is widespread across most of sub-Saharan Africa, but does not occur in the horn of Africa and Southwest Africa. It is found in the rainforest, riverine vegetation, secondary growth forest, moist woodlands, and all moist forest and woodland mosaics.

Northern region - Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi
In the Serengeti National Park, the species has only been recorded in the North, on the Northeast park boundary. It was recorded frequently during a camera trapping survey in the Ngorongoro highlands (51 sightings in 915 camera trap days), and has also been recorded in Arusha National Park (10 sightings in ??? camera trap days). There are no records from Kilimanjaro National Park and Mkomazi Game Reserve. However there are published records from Mkomazi Game Reserve (Eltringham et al. undated) and historical and recent records from Kilimanjaro (Hollister 1919, Grimshaw et al. 1995, Moreau 1944) and from Kilambeni village forest (Cordeiro et al. 2005).
Maasai steppe - Tarangire, Manyara, Simanjiro, Mkungunero.
The species has been recorded in Tarangire National Park in a camera trap survey there (14 sightings out of 1,169 camera trap days). It was also recorded frequently in a very short camera trap survey in Manyara National Park (16 sightings out of 74 camera trap days), and on Manyara ranch. There are no records far from protected areas.
North west and central region - Ugalla, Mahale, Minziro, Bukoba, Rubondo, Singida, Dodoma, Tabora, Moyowosi/Kigosi.

The species has been recorded in Mahale Mountains and Rubondo National Parks, and in a camera trap survey from Minziro forest reserve (7 sightings out of 1,503 camera trap days), but nowhere else in this region.

Rukwa-Lukwati - includes Katavi, Ruaha, Rungwa, Lwafi

The species has been recorded between Muhesi and Kisigo Game Reserves, and in Katavi National Park, but nowhere else in this region. The Southern Highlands Project lists the species as present in Rukwa region. There are historical records also from Rukwa Valley (Vesey-FitzGerald 1964).

Selous-Niassa - includes Mikumi, Lindi

The species has been recorded in the north the Selous Game Reserve but nowhere else in this region.

Coast - includes Mtwara, Zanzibar and Saadani

There are no records of the species from this region.

Southern highlands - includes Mbeya, Rungwe, Kitulo, Mpanga/Kipengere

There are no records of the species from this region from the Carnivore Atlas, however the Southern Highlands Project lists it as being present in southern Tanganyika, Mbeya region and Rungwe Game Reserve.

Eastern Arc Mountains - includes Usambaras, Uluguru, Udzungwa

There is a sighting record of the species from just north of the Udzungwas Mountains National Park. There are also records of the species between the Udzungwas and Dodoma. The Southern Highlands Project lists the species as being present in Udzungwa Mountains National Park, and in the Iringa and Morogoro regions. There are published records of the species from the East and West Usambara and Uluguru Mountains (Rodgers and Homewood 1982). There are also more specific records from the Usambaras, including Kilanga and Lutindi areas of Mount Nilo Forest Reserve and Chome Forest Reserve (Coreiro et al. 2005).

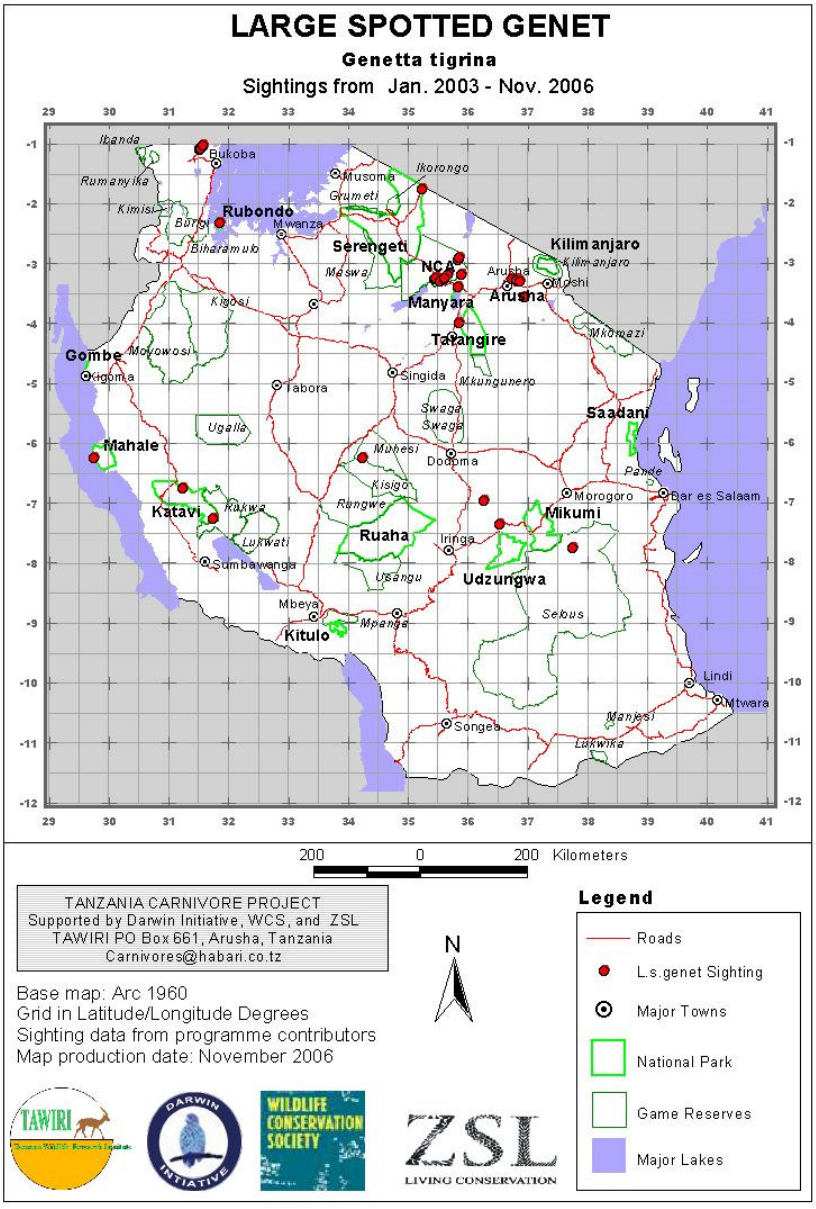

Fig. 33 Map of known sightings of the Large Spotted Genet submitted to the Tanzania Carnivore Project since 2002 up until the time of the workshop. Data submitted are in two forms, either as direct GPS locations, or as a grid square as identified on the map. The former data type are plotted on the map directly, whilst the latter data type are plotted at the centre of the reported grid square.

4.17 Miombo genet: Summary of current knowledge.

Insert photo from web?. Fig 34

Scientific name: *Genetta angolensis*
Names in use in Tanzania: Miombo genet (English)
CITES: Not listed.
IUCN Red list: Least concern (1996), population trends not listed.

Physical description.
The Miombo genet was originally thought to be a subspecies of the large spotted genet, but was given a separate species classification which has been supported by genetic analysis (Gaubert et al. 2004). There is very little information on this species, beyond the phylogenetic analysis. The pelage of the Miombo genet tends to have a more reddish tinge than that in the other genets, with a dark gray or dark reddish-gray background with black to brownish-black spots. The underside of the body is paler. The tail is more thickly furred than in other species and has a black underside and eight black rings. The tail tip may be light, or the last black tail ring may merge into a black tip. The face is dark gray with a slightly paler supra-orbital spot. The sub-orbital region, front of the upper lip, and chin are white, while the back of the upper lip and dorsal surface of the nose are black. There is also a black stripe from the middle of the forehead that stretches along the spine. Very dark or melanistic individuals are not uncommon. (Haltenorth & Diller 1980, Estes 1991, Ewer 1973). It weighs between1.3-2kg, and has a head to body length of 44-48cm and tail length of 38-43cm (Kingdon 2004). The dental formula is the same as in the other genets, 3/3-1/1-4/4-2/2.

Ecology
Not known

Mortality and reproduction
Little is known about the species.

Distribution and habitat
The Miombo genet, as its name suggests is largely restricted to Miombo woodlands in Zambia, Angola, Mozambique, DRC, Malawi and Tanzania. The distribution in Tanzania according to WCMC is restricted to the western part of the country, stretching across one third of the country inland, suggesting that it may be prefer highland Miombo habitat rather than lowland Miombo such as in the Selous Game Reserve. The northern distribution stops with the Rwandan border. The Tanzania Carnivore Atlas Project has received only 7 records of this species, only one of these has verifiable support, from Francesco Rovero in the Udzungwas. Given the difficulty of distinguishing the genet species, even by trained experts, non-verified sightings should be regarded with caution. The Southern Highlands Project has no records of the species, although they remark that it is known in the Selous Game Reserve.

Northern region - Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi
The species has not been recorded in this region, and is unlikely to be present as the habitat is unsuitable.
Maasai steppe - Tarangire, Manyara, Simanjiro, Mkungunero.
The species has not been recorded in this region, and is unlikely to be present as the habitat is unsuitable.

North west and central region - Ugalla, Mahale, Minziro, Bukoba, Rubondo, Singida, Dodoma, Tabora, Moyowosi/Kigosi.
The species has not been recorded in this region, however the southern and western parts of this region should have suitable habitat for the species.
Rukwa-Lukwati - includes Katavi, Ruaha, Rungwa, Lwafi
There is a single record of the species in this region in the vicinity of Muhesi/Kisigo game reserves. The habitat of the region should be suitable for the species.
Selous-Niassa - includes Mikumi, Lindi
The species has not been recorded in this region, according to the WCMC published distribution the species should only be present in the south western section of the Selous Game Reserve.
Coast - includes Mtwara, Zanzibar and Saadani
There are records of the species from this region between Dar es Salaam and Lindi, however these records are of sightings only and hence are not verifiable, and outside the published range of the species.
Southern highlands - includes Mbeya, Rungwe, Kitulo, Mpanga/Kipengere
There are no records of the species from this region, although it should contain suitable habitat.
Eastern arc mountains - includes Usambaras, Uluguru, Udzungwa
There is a single record of the species from the Udzungwas Mountains National Park from a camera trapping survey in the park; this constitutes an expansion of the species range eastwards from that published.

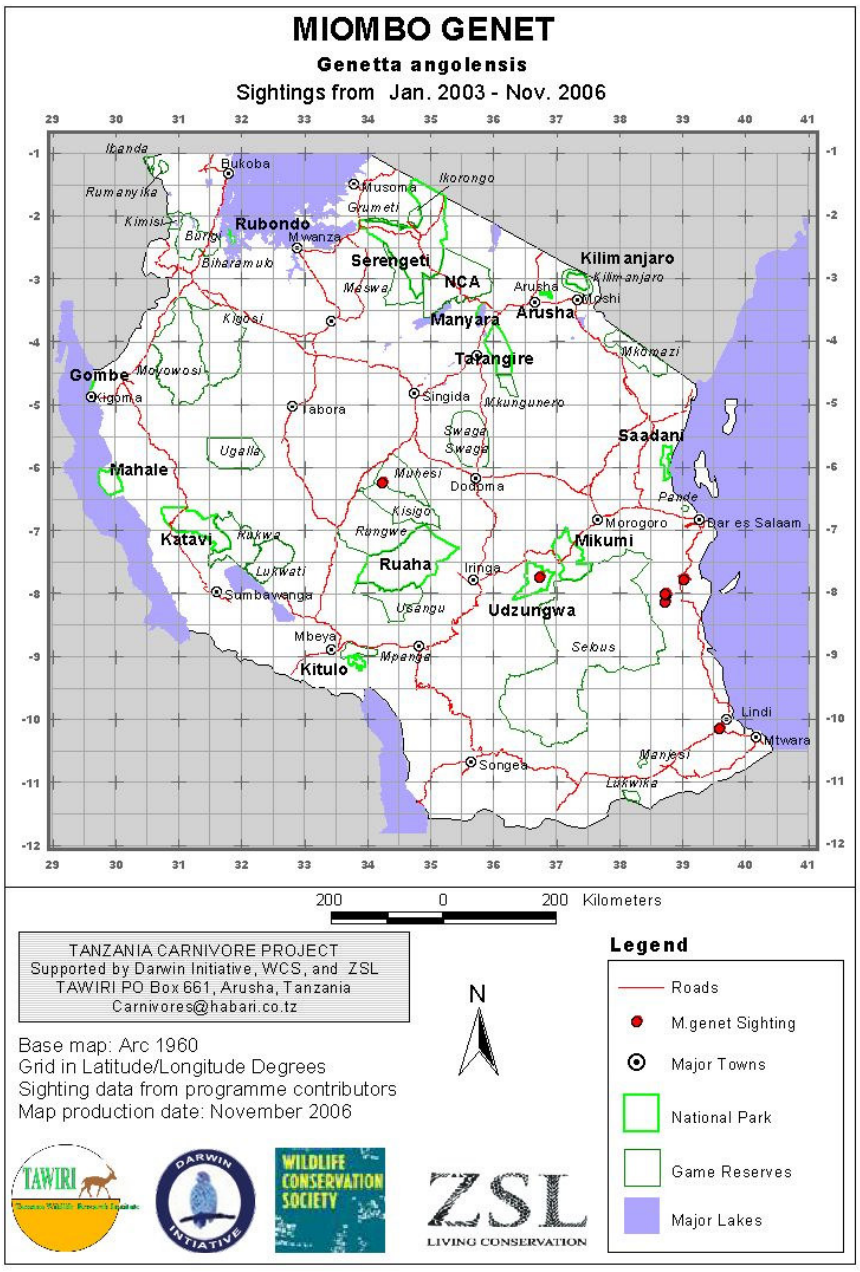

Fig. 35 Map of known sightings of the Miombo Genet submitted to the Tanzania Carnivore Project since 2002 up until the time of the workshop. Data submitted are in two forms, either as direct GPS locations, or as a grid square as identified on the map. The former data type are plotted on the map directly, whilst the latter data type are plotted at the centre of the reported grid square.

4.19 Servaline genet: Summary of current knowledge

Insert photo – from Francesco? Fig. 36

Scientific name: *Genetta servalina*
Names in use in Tanzania: Servaline genet (English)
CITES: Not listed.
IUCN Red list: Least concern (1996), population trends not listed.

Physical description
The servaline genet is relatively easy to recognise. It has a narrow face and relatively long legs, with short fur with numerous black spots, close together over a light background, giving it a darker appearance than the other species. There are four subspecies in East Africa, G*. s intense*, G*. s. bettoni,* G*. s. lowei* and G*.s. archeri*. Only *G. s. lowei* and *G.s. archeri* are found in Tanzania, the latter being the Zanzibar servaline genet, which was only recently described (Van Rompaey & Colyn 1998). Lowes genet, *G. s. lowei*, is little known and only recently rediscovered (Brink et al. 2002), but is thought to be confined to the Southern Highlands. The species weighs between 1-1.12kg, and has a head and body length of 41-50cm and tail length of 35-44cm (Kingdon 1977). The dental formula is the same as the other genets, 3/3 1/1 4/4 2/2.

Ecology
Not known

Mortality and reproduction
Little is known about the species.

Distribution and habitat
The servaline genet is restricted to forest habitat. Whilst it is widespread across the central African forests, in Tanzania it has a very limited distribution and is documented in few areas. WCMC report the species to occur in a narrow band along the western boundary of the country, and a separate population stretching from the north of Lake Malawi through to the Udzungwa Mountains and in Zanzibar. There is little evidence to support such a widespread distribution. The species can be confused with the other genets to the untrained eye, and hence all non verified observations should be treated with caution.

Northern region - Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi
The species is unlikely to be present in this area as there are no confirmed observations in published records of its distribution.
Maasai steppe - Tarangire, Manyara, Simanjiro, Mkungunero.
The species is unlikely to be present in this area as there are no confirmed observations in published records of its distribution.
North West and Central region - Ugalla, Mahale, Minziro, Bukoba, Rubondo, Singida, Dodoma, Tabora, Moyowosi/Kigosi.
Whilst there are reports of the species in Mahale Mountains National Park, these were not confirmed by camera trap survey, and hence these sightings remain unverified. There is a record south of Singida, but this is more likely to be common genet.
Rukwa-Lukwati - includes Katavi, Ruaha, Rungwa, Lwafi
There are no records of the species from this region.
Selous-Niassa - includes Mikumi, Lindi
There are two records of the species from this area, one through camera traps by the southern highlands project to the far north western border of the Selous Game Reserve, the other from the north, is not verifiable but is unlikely to be a servaline genet.
Coast - includes Mtwara, Zanzibar and Saadani
There are no records of the species from this region outside of the Jozani forest on Zanzibar island.

Southern highlands - includes Mbeya, Rungwe, Kitulo, Mpanga/Kipengere
There are no records of the species from this region.
Eastern arc mountains - includes Usambaras, Uluguru, Udzungwa
There are two records of the species from the Udzungwas Mountains National Park, one from a camera trapping survey in the park by Francesco Rovario, the other an observation from an experienced naturalist – Trevor Jones – in the same area. The Southern Highlands Project reports the species as resident in Morogoro region.

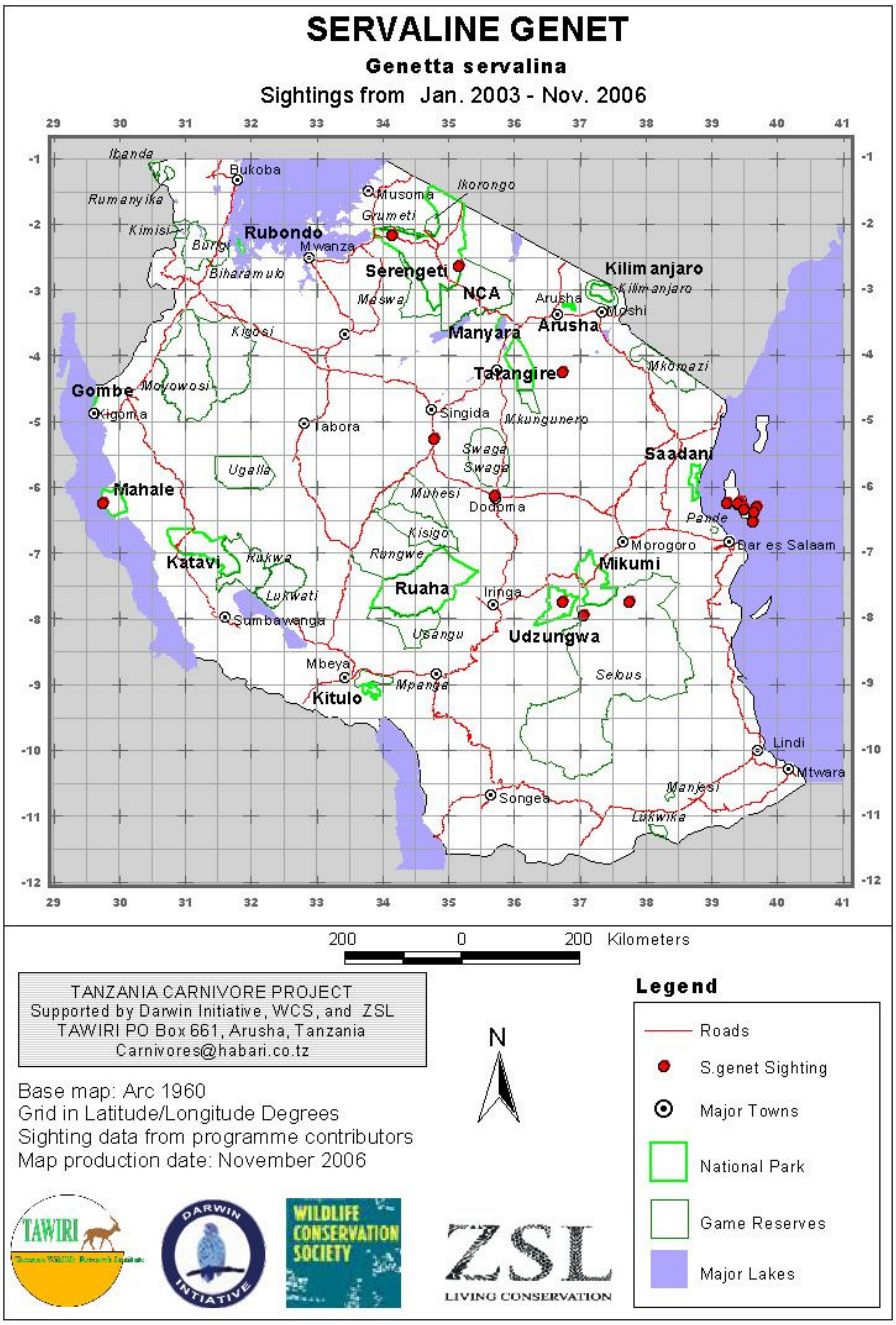

Fig. 37 Map of known sightings of the servaline genet submitted to the Tanzania Carnivore Project since 2002 up until the time of the workshop. Data submitted are in two forms, either as direct GPS locations, or as a grid square as identified on the map. The former data type are plotted on the map directly, whilst the latter data type are plotted at the centre of the reported grid square.

4.19 Banded mongoose: Summary of current knowledge

Scientific name: *Mungos Mungo*
Names in use in Tanzania: Banded mongoose (English)
CITES: Not listed.
IUCN Red list: Least concern (1996), population trends not listed.

Fig. 38 Banded mongoose

Physical description

Banded mongooses are a medium size mongoose, brownish grey with dark brown bands edged with yellowish or white across the back. The fur is coarse, and the tail is not bushy but covered with coarse hair and taperd toward the tip. The foreclaws are long and there are five digits on both fore and hind feet, with the fifth digit just visible on spoor to the rear of the foot, level with the main pad. Head and body length is 30-45cm, tail length 23-29cm and weight is 1.0-2.2kg (Kingdon 1977). The dentition is 3/3-1/1-3/3-2/2=36. The species is highly vocal, and individuals communicate constantly through a twittering call with other members of their group whilst foraging. There are also various agonistic growls and screams and alarm chitters.

Ecology

Banded mongooses are perhaps one of the best studied of the mongoose species. They prefer grassland, brushland, woodland and rocky broken country. They live in communal underground dens, which are normally placed in old termite mounds, but also in erosion gullies, abandoned aardvark holes and hollow logs. Dens consist of 1-9 entrance holes, a central sleeping area of about 1-2 cubic metres, and perhaps several smaller chambers. Dens are often temporary, although favourite sites are returned to and can be occupied for as long as 2 months. Banded mongooses are diurnal, and have an excellent sense of vision, hearing and smell. A group forages for several hours close to the den resting in the hottest part of the day and foraging again in the evening, returning to the same or a different den before sunset. If young are present in the den then the group return to the same den. A group can cover 2-3 km per day, moving in a zigzag pattern and searching among rocks and vegetation for food. The diet consists largely of invertebrates, especially beetles, earthworms, grasshoppers and millipedes, but also includes small vertebrates and eggs. They have been recorded as eating a wide range of prey, including crabs, scorpions, slugs, snails, lizards, small snakes, reptile eggs, rodents, shrews, ground birds and their eggs and fallen fruit (Kingdon 1977). They often concentrate on dung piles when foraging, searching for dung beetles. Banded mongooses are adept at breaking even quite large eggs by grasping the object in their forefeet and propelling it backwards against a hard object. They may also frequent gargbage dumps at lodges and around human habitation, where they feed not only on the garbage but on invertebrates attracted to the dumps (Otali & Gilchrist 2004).

Group home range has been recorded as averaging 80.2ha (range 28-100ha) in the Ruwenzori National Park in Uganda, but could be more than 400ha in the Serengeti (Rood – cited in Kingdon 1977). Ranges overlap and intergroup encounters are noisy and hostile and can result in chasing and fighting. Group size usually ranges between 10 and 20, but can be as many as 40 individuals, including adults of both sexes. There is a dominance hierarchy within the group, however there is

no reproductive suppression in this species as there is in some other social mongooses – such as the dwarf mongoose – and all adults will reproduce (De Luca & Ginsberg 2001). Females will mate with several males at a time during oestrus. Groups are cohesive and stable, but can split off, and there can be mating between different groups.

Mortality and reproduction

In East Africa reproduction occurs throughout the year and groups can breed as many as four times per year. Females synchronise births so that several females give birth at approximately the same time. Gestation is about 2 months and females often mate within 1-2 weeks after giving birth to young (Nowak 2005). Litter size ranges from 2-6, but is more usually 2-3. Kits are born blind and helpless, and raised communally by the group, suckling indiscriminately from any lactating female and guarded by one or two adult males whilst the rest of the group forages. They begin to travel with the others at about 1 month of age, and females become sexually mature at around 9-10 months (Simpson 1964). The maximum lifespan recorded in captivity was 12 years (Van Rompaey 1978). The species is almost certainly killed by other carnivores, but this has been seldom recorded. The young have been observed being killed by Marabou storks (de Luca 1998) and Martial eagles (Durant pers. obs.), and predatory birds are probably their main predators (Simpson 1964). In the Ruwenzori National Park, less than 50% of juveniles survived to 3 months (Rood 1974). The species adopts a spectacular self defence when challenged by other carnivores, amassing together and advancing against the threat in a writhing spitting clump (Kingdon 1977). There is little information on disease, but the species may be subject to rabies. In Uganda mortality of individuals over 6 months was 10% per year.

Distribution and habitat

Banded mongooses have a wide habitat tolerance, and are excluded only from desert. They occur in forests, however in the west and central African forests they are replaced by cusimanses, which may be why they are, at least partly, excluded from these areas. The species has a widespread distribution and is excluded from the Central African and West African forests, and occurs in a narrow band across the Sahelian belt, across east Africa to the horn of Africa, but is excluded from most of southern South Africa, Southern Botswana, much of Zimbabwe and South and West Namibia (Skinner and Smithers 1990). In these areas in southern Africa the banded mongoose is replaced by the meerkat. Densities can be quite high. In the Ruwenzori National Park in Uganda densities have been estimated as around 18/km^2. However density, in general, is difficult to measure, and there are no comparable estimates for other habitats.

The Tanzania Carnivore Atlas project has numerous records of sightings of this species which are widespread across the country.

Northern region - Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi

There are many records of banded mongooses from across the Serengeti National Park. There are fewer records from the North or West, but this is probably due to the relatively low numbers of observers in these areas rather than a rarity of this species. Records from Ngorongoro Conservation Area are more unusual, with records from the main road and around Olduvai Gorge, but none to the northern border of the conservation area. It is possible that there is too little cover and termite mounds to enable the species to survive in the more open parts of this protected area. There are records of the species from Ikorongo Game Reserve, but no records from Grumeti or Maswa Game Reserves. There are also records of the species in Arusha National Park, but not in Kilimanjaro or Mkomazi, and surprisingly few records of the species outside the protected areas. There are historical records from Mkomazi Game Reserve (Eltringham et al. undated) and there is no reason to assume that the species does not still occur there. There are also historical records from Kilmanjaro (Moreau 1944, Grimshaw et al. 1995, Child 1965).

Maasai steppe - Tarangire, Manyara, Simanjiro, Mkungunero.

The species has been recorded in Manyara and Tarangire National Parks, and to the South East of Lake Eyasi, and North and West of Tarangire National Park on the Maasai steppe. It is likely to be

widespread across this region. There are also published records from Mgori forest reserve (Kaswamila et al. 2003).

North west and central region - Ugalla, Mahale, Minziro, Bukoba, Rubondo, Singida, Dodoma, Tabora, Moyowosi/Kigosi.

The species has been recorded in Mahale Mountains National Park, Moyowosi and Ugalla Game Reserves and around Singida. There is no information from elsewhere in the region, and the species wasn't detected in a camera trap survey in Minziro forest reserve.

Rukwa-Lukwati - includes Katavi, Ruaha, Rungwa, Lwafi

The species has been recorded in Rukwa, Muhesi and Kisigo Game Reserves, and Katavi National Park. It has also been recorded outside protected areas, to the west of the Ruaha complex, and to the east of Sumbawanga. It is likely to be widespread in this area.

Selous-Niassa - includes Mikumi, Lindi

There are several records of the species in the Northeast of the Selous Game Reserve, and the species has also been observed in Mikumi National Park. It is likely to be widespread across the region, and the lack of records is a reflection of the lack of observers in this region. There are published records from Kilombero Valley (Starkey 1997).

Coast - includes Mtwara, Zanzibar and Saadani

The species has been recorded near Lindi and midway between Dar es Salaam and Lindi. It has also been recorded on the campus at Dar es Salaam University.

Southern highlands - includes Mbeya, Rungwe, Kitulo, Mpanga/Kipengere

There are no records in the Carnivore Atlas Project of the species from this region.

Eastern arc mountains - includes Usambaras, Uluguru, Udzungwa

There are records of the species from the Udzungwas Mountains National Park, but no records of the species from elsewhere in this region. The Southern Highlands Project lists the species as present in the Iringa and Morogoro region, and in the lowland forest on the Udzungwas. The species was historically commonly seen in Morogoro (Loveridge 1922), including the Ulanga district (Rees 1964). There are also published recent and historical records from the East Usambara Mountains (Rodgers and Homewood 1982), including Amani nature reserve (Mercer 2000), Bombo forest reserve (Clarke and Dickenson 1995) and Mount Nilo forest reserve Kilanga and Lutindi areas (Cordeiro et al. 2005).

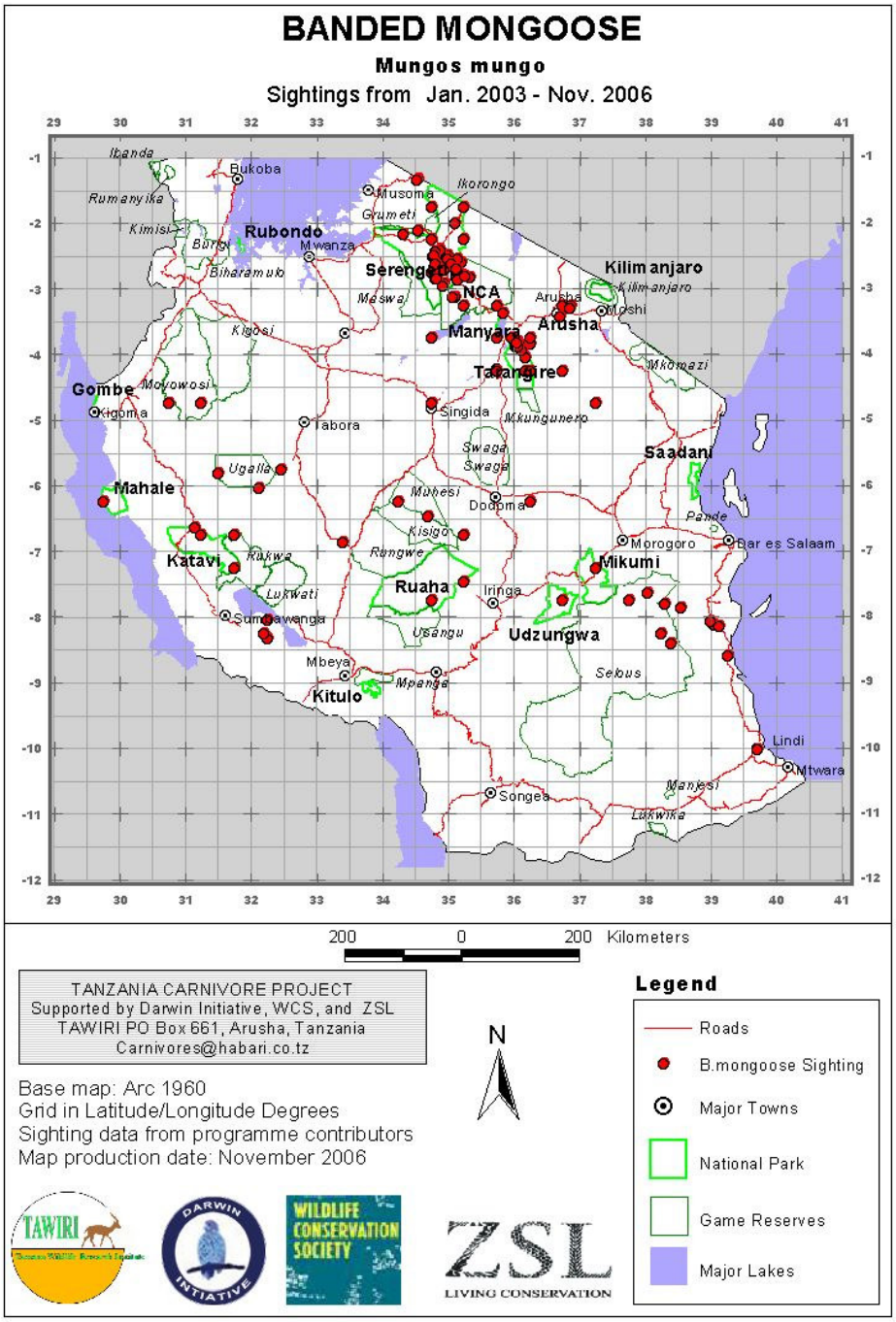

Fig. 39 Map of known sightings of the banded mongoose submitted to the Tanzania Carnivore Project since 2002 up until the time of the workshop. Data submitted are in two forms, either as direct GPS locations, or as a grid square as identified on the map. The former data type are plotted on the map directly, whilst the latter data type are plotted at the centre of the reported grid square.

4.20 Dwarf mongoose: Summary of current knowledge

Scientific name: *Helogale parvula*
Names in use in Tanzania: Dwarf mongoose (English)
CITES: Not listed.
IUCN Red list: Least concern (1996), population trends not listed.

Fig. 40 Dwarf mongoose

Physical description

Dwarf mongooses are one of the smallest mongoose species. They are a speckled colour, generally brownish with a strong rufus tinge, the lower parts slightly paler than the upper parts. The fur is soft. The foreclaws are long and sharp there are five digits on both fore and hind feet, with the fifth digit appearing on spoor to the rear of the foot, level with the main pad, more visible on the hind foot than the fore foot. Head and body length is 18-26cm, tail length 12-20cm and weight averages 300g, ranging between 230-680g (Kingdon 2004). The dental formula is 3/3-1/1-3/3-2/2=36. As with the other Tanzanian social mongoose, the banded mongoose, this species is highly vocal, and individuals communicate constantly through a series of chirps with other members of their group whilst foraging. They also give a distinctive chu-chwee alarm call when danger is spotted, usually on the appearance of a predator such as a bird of prey or a jackal or snake.

Ecology

Dwarf mongooses are found in a variety of habitats, ranging from savannahs, woodlands and mountains, but are not found at altitudes above 2000m. They are mainly terrestrial and diurnal, spending the night in underground dens, usually in termite mounds, among gnarled roots of trees and in rocky crevices. Dens are changed frequently, however they return to favourite sites. They live in organised groups, with a strict hierarchy. Home range is shifted every few months, presumably due to changes in food supplies. In the Serengeti, group home ranges average 30ha, overlapping by 5-40% with the ranges of one to four neighbouring packs and containing 10-20 densites within each home range (Rood 1978). Den sites are marked with secretions from the cheek and anal glands. Rasa documents larger home ranges of 0.65-0.96km^2, with little overlap and which are traversed every 20-26 days, which is about the length of time it takes for marking secretions to disappear. The species is particularly common in areas with plenty of termitaries, raising the possibility that these shelters may be necessary for their survival (Kingdon 1977). The mounds of *Odontotermes* seem to be preferred for den sites (Rasa 1985). Kingdon (1977) observed that faeces do not seem to be used for marking, and although the group tend to use the same spot, this is generally in a corner or crevice, away from the sleeping den, however Skinner and Smithers (1990) note that dens where the mongooses are resident are characterised by substantial accumulations of scats in the vicinity of the entrances.

Group size is usually 10-12 but may be as large as 40. The groups are matriarchal, founded and led by the oldest female (Keane et al. 1994). The second ranking individual is her mate, usually the oldest male. These two dominant individuals are monogamous and are usually the only individuals of the group to produce offspring, suppressing sexual activity in subordinates. There is a hierarchy within the subordinates, with the youngest individuals less than 3 months old, ranking

highest. Within any age class females are dominant over males. The subordinate adults help in raising the young, cleaning, carrying and warming them, and bringing food to them. They also take turns baby sitting whislt the rest of the group forages. The group is highly social, and there have been many observations of extra care being provided to sick or injured members. If the dominant female dies the group may split, but usually her position is taken over by the oldest female within the pack (Rood 1990).

The diet consists mainly of insects (Rasa 1977; Rood 1990) but also includes small vertebrates, eggs and fruit: scorpions, myriapods, spiders, worms, slugs, snails, frogs, rodents, reptiles, birds and their eggs have all been recorded (Kingdon 1977). These are excavated from decayed wood, earth or crevices after being located by sound or smell and then digging with their long claws. As with the banded mongoose, eggs are broken by kicking them backwards against a stump or rock.

Dwarf mongooses have been reported as having a symbiotic relationship with hornbills, which they follow, catching grasshoppers flying from their feet, whilst providing an early warning system in return (Rasa 1983), and with some species of lizards, which are reputed to feed on the pellets of the mongoose (Skinner and Smithers 1990).

Mortality and reproduction

In the Serengeti National Park, where most information on this species comes from, births occur mainly in the wet season from November to May, and the alpha female usually has three litters per year (Rood 1978, 1980). Subordinate females and males usually do not reproduce, but occasionally they may mate, but have never been observed rearing offspring, probably beause of infanticide (Skinner and Smithers 1990). Subordinates may lactate and suckle the young of the alpha female (Rasa 1980). In captivity in Europe females have been recorded as giving birth twice a year, entering estrus 4-7 days after the end of lactation. Gestation is 49-56 days and the number of young per litter is usually around 2-4, with a mean of 3.04 (Rasa 1986), but can range from 1-7. The kits are suckled for at least 45 days, but are brought solid food by group members once they are about 3 weeks old (Kingdon 1977). Survival of the young and/or litter size increases with adult group size (Rood 1990; Rasa 1986). The young start to forage with the group by the time they are 6 months, with females reaching sexual maturity from 107 days (Zannier 1965), although social restrictions normally delay breeding for several years, if at all. Full physical maturity is attained very late for such a small species – around 3 years (Rasa 1972).

Mortality is little documented, but Kingdon (1977) notes that the survival of young in one litter was well below 50%. Mongooses are predated by hawks, including chanting goshawks, tawny eagles, marital eagles; other carnivores, including Egyptian and slender mongoose; black backed jackals, honey badgers, and snakes, including pythons, spitting cobras and puff adders (Rasa 1983; Rood 1990) and serval (Durant per obs.). Their tendancy to explore and forage away from the group may also lead to them getting lost (Kingdon 1977). They are eaten in some areas by people, and are often persecuted as egg thieves, although their capacity for reducing rodent populations should make up for any loss of eggs. The maximum lifespan recorded in captivity is 12 years (Nowak 2005).

Distribution and habitat

Densities are undocumented for this species, but given their small home range size, are likely to be high in suitable habitat. Published distribution covers all of Tanzania, ranging from southern Somalia to the northern part of South Africa, and stretching across to Southwestern and Central Angola and the extreme South of DRC (Kingdon 2004). The species also occurs in South East Uganda, Southern Kenya, Zambia, Mozambique, Malawi, Northern Namibia, Botswana, and along the borders of Zimbabwe. It is principally a savannah species associated with semi-desert and dry open woodland and grassland.

The Tanzania Carnivore Atlas project has several records of sightings of this species which are widespread across the country.

Northern region - Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi
The species has been documented in the Serengeti National Park, in the central area, to the north and towards the west. It is probably widespread across the park. It has also been recorded around Olduvai Gorge around the northern border of the Ngorongoro Conservation Area and Serengeti National Park, and outside the park in the Loliondo Game Controlled Area, close to the Kenyan border. It has been recorded in Grumeti and Ikorongo Game Reserves but not in the Maswa or Mkomazi Game Reserves. There are no observations of the species in Arusha and Kilimanjaro National Parks – it is likely that these parks are too high for the species, however it has been observed in the west Kilimanjaro region. There are historical records from Mkomazi Game Reserve (Eltringham et al. undated).
Maasai steppe - Tarangire, Manyara, Simanjiro, Mkungunero.
The species has been recorded in Tarangire National Park, and to the south east of Lake Eyasi, and East of Tarangire National Park on the Maasai steppe. It has not been recorded in Manyara National Park.
North west and central region - Ugalla, Mahale, Minziro, Bukoba, Rubondo, Singida, Dodoma, Tabora, Moyowosi/Kigosi.
The species has been recorded in Mahale Mountains National Park, Moyowosi Game Reserve and east of Dodoma, and Mwanza but nowhere else in this region. The species was not detected in a recent camera trap survey in Minziro forest reserve.
Rukwa-Lukwati - includes Katavi, Ruaha, Rungwa, Lwafi
The species has been recorded in Rukwa, Muhesi and Kisigo game reserves, and Katavi and Ruaha National Parks. It has not been recorded outside the protected areas in this region.
Selous-Niassa - includes Mikumi, Lindi
There are a few records of the species in the Northeast of the Selous Game Reserve, and the species has also been observed in Mikumi National Park. There are no other records in this region.
Coast - includes Mtwara, Zanzibar and Saadani
The species has been recorded near Lindi and between Dar es Salaam and Lindi, and around 100km west of Saadani National Park. There are no other records in this region.
Southern highlands - includes Mbeya, Rungwe, Kitulo, Mpanga/Kipengere
The species has been recorded in Rungwe Game Reserve, but there are no other records in the Carnivore Atlas Project of the species from this region. The Southern Highlands Project reports the species as present south of Mpanga, close to Lake Nyasa.
Eastern Arc Mountains - includes Usambaras, Uluguru, Udzungwa
There is a record of the species close to Iringa, but there are no other records of this species in this region. The Southern Highlands Project reports that the species was claimed to be present by the majority of people interviewd in this area, and have documented it in the Morogoro and Iringa regions.

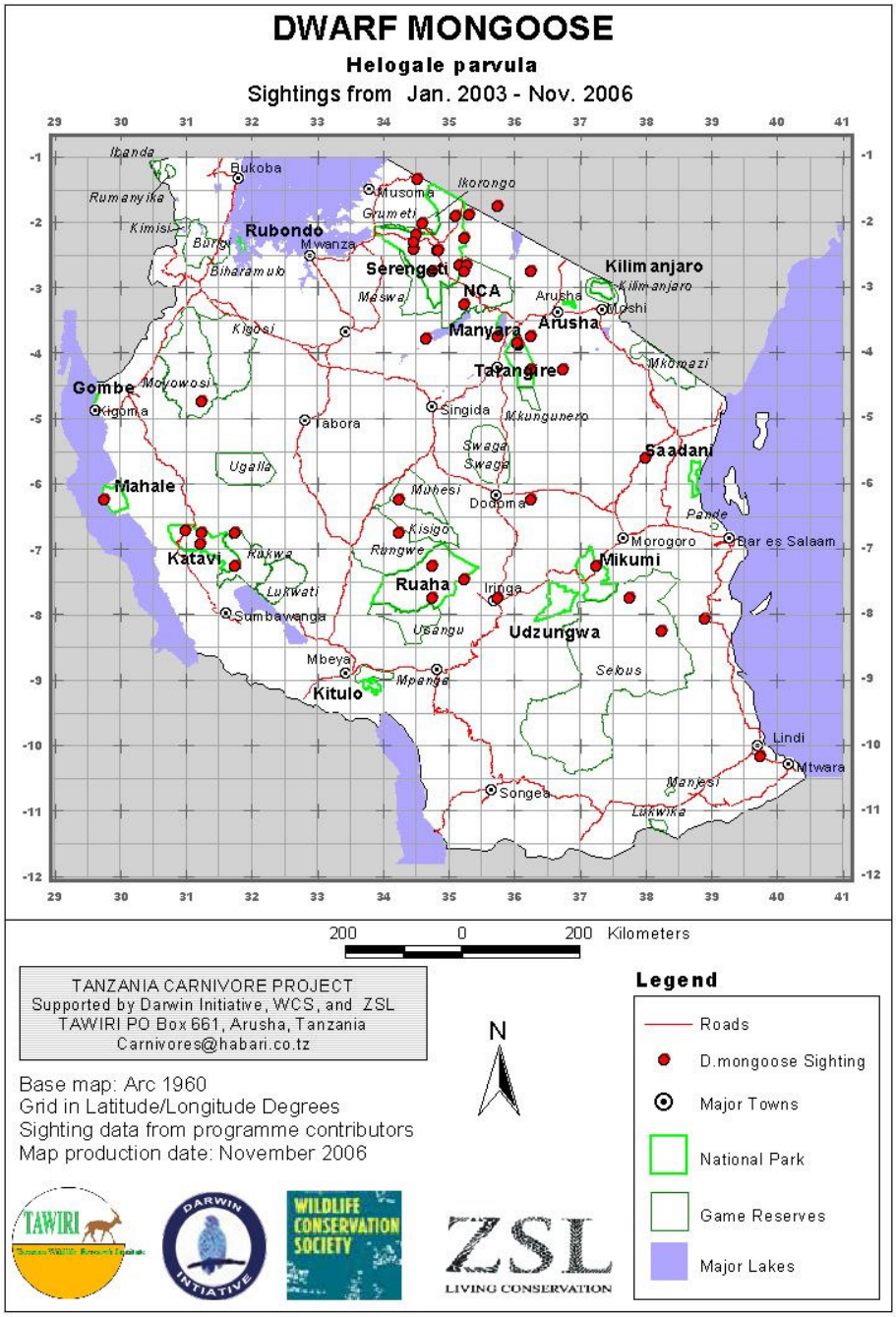

Fig. 41 Map of known sightings of the dwarf mongoose submitted to the Tanzania Carnivore Project since 2002 up until the time of the workshop. Data submitted are in two forms, either as direct GPS locations, or as a grid square as identified on the map. The former data type are plotted on the map directly, whilst the latter data type are plotted at the centre of the reported grid square.

4.22 Slender mongoose: Summary of current knowledge

Scientific name: *Herpestes sanguineus*
Names in use in Tanzania: Slender mongoose (English)
CITES: Not listed.
IUCN Red list: Least concern (1996), population trends not listed.

Fig. 42 Slender mongoose (photographed in Botswana)

Physical description

Slender mongooses are characterised by grizzled short hair which is a yellowish grey, or khaki, with a long dark tail generally turned up at the end. But there is a wide variation in colour, and dark brown or near black individuals are not uncommon. The mongoose is long bodied and short legged. They are generally silent, but occasionally make a scolding cry of alarm. There are five digits on both fore and hind feet, but the fifth toe is not visible in spoor, except in soft substrates. Head and body length is 26.8-33.8cm, tail length 24-29cm and weight averages 600(425-683)g for males and 500(350-515)g for females (Kingdon 1977). The dentition is 3/3-1/1-4/3-2/2=38.

Ecology

Slender mongooses are more arboreal than most mongoose species, able to climb up and down trees with great rapidity, although the species still spends a large amount of time on the ground. Their diet includes species as large as squirrels, rodents, particularly rats and murids, insects and birds, chamaeleons, bird eggs and nestlings, snakes, lizards, toads, frogs. In Namibia they have been reported as eating fruit, nuts and berries. They have been recorded as killing and eating dwarf mongooses. Kingdon (1977) reports rats and murids as forming the major portion of the diet, whilst Skinner and Smithers (1990) report insects as being more important. They are frequently mobbed, no doubt due to their predatory habits. They find their food when foraging, and when they locate prey they adopt a stalking posture, with their head down and their legs crouched. Large preys are killed with bites at the neck, and most of the prey is eaten. In East Africa they appear to be diurnal, although they have been reported as being nocturnal elsewhere. During the night they make use of holes in the ground fallen trees, crevices in rocks, and termitaria.

Little is known about ranging patterns. A range of about 1km^2 was estimated on the basis of trapping records in central Kenya (Taylor 1970); however it is not clear whether or not they are territorial. They are thought not to scentmark either through using their anal glands, or through scat (Kingdon 1977). There are reports of stable male coalition formation occurring in this species (Waser et al. 1994).

Mortality and reproduction

Very little is known about reproduction in the wild, although they do seem to pair bond at least during the rearing of the young, however this relationship appears to break down when the young reach adulthood (Kingdon 1977; Ansell 1970). Five gravid females had a mean of 1.8 (1-2) foetuses (Skinnder and Smithers 1990). The young are born in den sites similar to those used at night. They are reported to be taken by birds of prey and they are very sensitive to large birds flying overhead. The species has been reported as suffering from rabies (Asterly Maberly 1963); rickettsia (Heisch et al. 1962) and nematodes and flea parasites (Loveridge 1923).

Distribution and habitat

The species occurs across a wide range of habitats from arid scrubland through bush and woodlands through to high forest and papyrus swamps, ranging up to altitudes of 2,500m. It is thus widespread across Africa, and is excluded only from the Sahara desert, the central African rain forests, and the southern third of South Africa and the Namibian coastal strip. There is no information on density. It is documented to be widespread across Tanzania.

The Tanzania Carnivore Atlas project has several records of sightings of this species which are widespread across the country.

Northern region - Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi

The species has been documented in the Serengeti National Park, in the central area, to the north and towards the west. It is probably widespread across the park. It has also been recorded around Olduvai Gorge around the border of the Ngorongoro Conservation Area and Serengeti National Park. It was recorded during the camera trap survey in Ngorongoro Conservation Area 20 times out of 915 camera trap days, including one sighting of the melanistic form. It has not been recorded in Grumeti, Ikorongo and Maswa Game Reserves. However there are records of the species in Arusha and Kilimanjaro National Parks and in Mkomazi Game Reserve.

Maasai steppe - Tarangire, Manyara, Simanjiro, Mkungunero.

The species has been recorded in Lake Manyara and Tarangire National Parks, and to the south east of Lake Eyasi, and east of Tarangire National Park on the Maasai steppe.

North west and central region - Ugalla, Mahale, Minziro, Bukoba, Rubondo, Singida, Dodoma, Tabora, Moyowosi/Kigosi.

The species has been recorded in Mahale Mountains National Park but not elsewhere this region, including during an extensive camera trap survey in Minziro Forest Reserve, although it is likely to be widespread.

Rukwa-Lukwati - includes Katavi, Ruaha, Rungwa, Lwafi

The species has been recorded in Kisigo Game Reserve, and Katavi and Ruaha National Parks. It has not been recorded elsewhere in this region, although it is likely to be widespread.

Selous-Niassa - includes Mikumi, Lindi

There are a few records of the species in the northeast of the Selous Game Reserve, but no records from Mikumi. There are no other records in this region, but, again, it is likely to be widespread throughout.

Coast - includes Mtwara, Zanzibar and Saadani

The species has been recorded between Dar es Salaam and Lindi, and approximately 100km west of Saadani National Park. There are also a number of records from a camera trapping survey on Zanzibar. There are no other records in this region.

Southern highlands - includes Mbeya, Rungwe, Kitulo, Mpanga/Kipengere

The species has been recorded in Rungwe Game Reserve, and to the South of Lake Rukwa, but there are no other records in the Carnivore Atlas Project of the species from this region. The Southern Highlands Project reports the species as present south of Mpanga, close to Lake Nyasa, and widely spread through Mbeya region and the Livingstone Mountains up to an atlitude of 2,300m.

Eastern arc mountains - includes Usambaras, Uluguru, Udzungwa

There is a record of the species close to Iringa and from the Udzungwa Mountains National Park, but there are no other records of this species in this region. The Southern Highlands Project reports that the species is present in Iringa region.

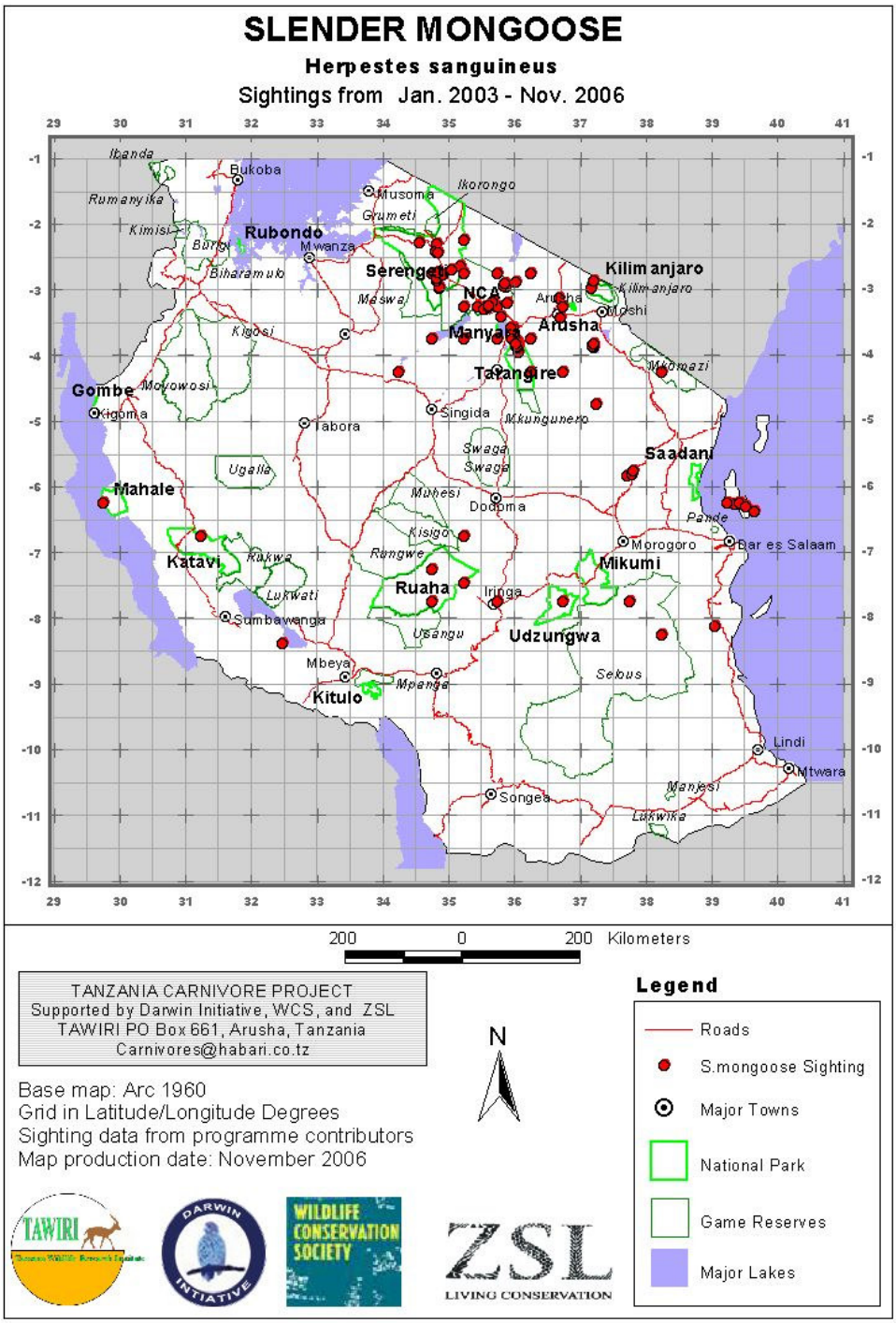

Fig. 43 Map of known sightings of the slender mongoose submitted to the Tanzania Carnivore Project since 2002 up until the time of the workshop. Data submitted are in two forms, either as direct GPS locations, or as a grid square as identified on the map. The former data type are plotted on the map directly, whilst the latter data type are plotted at the centre of the reported grid square.

4.23 White tailed mongoose: Summary of current knowledge

Insert photo from camera trap fig 44

Scientific name: *Ichneumia albicauda*
Names in use in Tanzania: White tailed mongoose (English)
CITES: Not listed.
IUCN Red list: Least concern (1996), population trends not listed.

Physical description
White tailed mongooses are relatively large mongooses, with a speckled greyish coat resulting from black guard hairs protruding from a whitish to yellowish woolly underfur. The basal half of the tail takes the underlying body colour, without the black speckling, turning to white to the end, although the end of the tail is occasionally black. The tail is strongly tapered, being very bushy at the base, and very narrow at the end. The legs are relatively long and black in colour, and there are five digits on both fore and hind feet, but the fifth toe is not visible in spoor. The species can be confused with Mellers mongoose, as this mongoose can also have a white tail. Selous mongoose also has a white tail but is not found in Tanzania, and the rare dog mongooses often have white tails, but are taller and more dog-like in appearance.

Head and body length is 47-71cm, tail length 35.5-47cm and weight averages 3.5 (Kingdon 1977), with a recorded range of 1.8-5.2kg (Kingdon 1977; Taylor 1972). Males are only slightly heavier than females. The dentition is 3/3 1/1 4/4 2/2=40. The species is highly vocal, using a whimpering call to keep in touch with each other, a vibrating and guttural purr, a muttering noise when digging, and a loud, rather dog-like, yap or bark which is probably associated with sexual activity (Kingdon 1977). There are supposedly 6 subspecies, with *I. a. igeana* distributed across most of Tanzania, whilst *i. a. grandis* may be dominant in the southern areas (Taylor 1972).

Ecology
White tailed mongooses are found mainly in savannahs and grassland, preferring areas of thick cover, such as forest edge and bush-fringed streams. It is terrestrial and fairly strictly nocturnal, denning in the day underground in porcupine or aardvark burrows, termite mounds, cavities under roots, tangles of vegetation or crevices in rocks. The diet consists mainly of insects and also includes snakes, other small vertebrates, fruit and carrion (Kingdon 1977, Nowak 2005, Skinner and Smithers 1990). As with the banded and dwarf mongoose, white tailed mongooses are able to break eggs by hurling them against hard objects. The diet varies seasonally, with the species making use of flying termites, grasshoppers, dung beetles and pupae and caterpillars during periods of high abundance. It is a common scavenger around areas of human habitation.

White tailed mongooses are normally seen solitary or in pairs or family partices, but are occasionally seen in larger groups (Kingdon 1977). Not much is known about mating behaviour, but as two adults are sometimes seen with subadults, pairs may have relatively long term associations. Home range size is little documented. One mongoose in Kenya had a home range size of 8km^2 (Taylor 1972). In the Bale Mountains in Ethiopia, average range size was 3.2 km^2 for three adult males and 2.6 km^2 for an adult female. In Tanzania the only information comes from the Serengeti, where average home range size was 0.97km^2 for adult males and 0.64 km^2 for adult females (Waser and Waser 1985). Male ranges did not overlap in this study, neither did the ranges of some females, but there was overlap between several females and their offspring. There was compete overlap between ranges of opposite sexes.

The species is able to produce a noxious secretion from its anal scent glands which it may use in self defence (Kingdon 1977).

Mortality and reproduction
The white tailed mongoose is thought to give birth to 2-4 young in a burrow (Kingdon 1977). However in the Serengeti, litter sizes of more than 2 post emergence have never been observed (Waser and Waser 1985). There may be a birth season as all litters observed by Waser and Waser (1985) in the Serengeti were seen most frequently in the long rains from February to May, with no young observed in the long dry season (Waser and Waser 1986). The young are independent by the time they reach 9 months. The longest lifespan recorded in captivity was 10 years (Jones 1982). Raptors are probably important predators (Taylor 1972), although, due to their nocturnal habits, these are more likely to be owls than diurnal raptors. Many mongooses die on the roads,

probably aggravated by the species scavenging from road kills (Taylor 1972), and the species may attack poultry and hence can be persecuted by people. It is also vulnerable to attack by dogs. Like other mongooses they are prossibly involved in the transmission of rabies and they are known as a reservoir for rickettsia-borne disease. Cestode worms have been recorded in the species (Ortlepp 1963). The maximum lifespan recorded in captivity is 10 years (Crandall 1964).

Kingdon (1977) reports that in the Singida area white tailed mongooses are regarded much like the black cat in the west, as a witches familiar, while in Teso the skin is used to protect babies. It is not clear whether these beliefs have any impact on wild populations.

Distribution and habitat

The species is widespread across a wide range of habitats, and occurs all across the southern part of the Arabian peninsula and in Africa from Senegal to Southeastern Egypt and South to North Eastern Namibia and Eastern South Africa, but it does not occur in the dense forest zone of West and Central Africa nor in the deserts of the north or southwest. It has been found up to an altitude of 2,500m. There is no information on density anywhere in its range. It is thought to be widespread across Tanzania.

The Tanzania Carnivore Atlas project has several records of sightings of this species in Tanzania, mainly in savannah habitats.

Northern region - Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi

The species has been documented in the Serengeti National Park, in the central area, but not in the north and towards the west. It is probably widespread across the park, but has not been recorded in these areas due to a lack of observers. There are also records of the species around Olduvai Gorge at the border of the Ngorongoro Conservation Area and Serengeti National Park. The species has also been recorded in Grumeti, Ikorongo and Maswa Game Reserves. Outside the Serengeti there are a number of records from Loliondo Game Controlled Area to the east of the park and beyond Lake Natron, north east of the NCA. The species has also been recorded in Arusha National Park, including during a camera trap survey there, and close to Moshi. It has not been recorded inside Kilimanjaro National Park, despite a camera trap survey there in 2005, however it has been recorded on the main road from Moshi to Dar es Salaam, close to Mkomazi Game Reserve, but there are no records from inside the reserve, although it is almost certainly present (Eltringham et al. undated). There are published historical records of the species in Mount Kilimanjaro National Park (Grimshaw and Foley 1990)

Maasai steppe - Tarangire, Manyara, Simanjiro, Mkungunero.

The species has been recorded in Tarangire National Park, where it is probably at high densities as it was sighted very often during a camera trap survey in the north of the park (79 sightings out of 1,169 camera trap days. It has also been recorded outside the parks to the south Lake Manyara, and east of Tarangire National Park on the Maasai steppe. It has also been recorded in Swaga Swaga Game Reserve.

North West and Central region - Ugalla, Mahale, Minziro, Bukoba, Rubondo, Singida, Dodoma, Tabora, Moyowosi/Kigosi.

The species has been recorded in Mahale Mountains National Park but not elsewhere this region, although it is likely to be widespread. It was not recorded in the recent camera trap survey of Minziro Forest Reserve, and is probably not present in the forest, as the habitat is unsuitable. There is a historical record of the species in Ugalla Game Reserve (Thomas 1962).

Rukwa-Lukwati - includes Katavi, Ruaha, Rungwa, Lwafi

The species has been recorded in Kisigo/Muhesi game reserve, and Katavi and Ruaha National Parks. It has not been recorded elsewhere in this region, although the Southern Highlands Project note that it is likely to occur in Rukwa Game Reserve and there are historical records from Rukwa Valley (Vesey-FitzGerald 1964).

Selous-Niassa - includes Mikumi, Lindi

There is a record of the species in the northeast of the Selous Game Reserve, but no records from Mikumi. There are no other records in this region, but it is likely to be widespread throughout in savannah habitat.

Coast - includes Mtwara, Zanzibar and Saadani
The species has not been recorded in this region. The habitat may be unsuitable.
Southern highlands - includes Mbeya, Rungwe, Kitulo, Mpanga/Kipengere
The species has not been recorded in this region. The Southern Highlands Project reports it as present in southern Tanganyika.
Eastern arc mountains - includes Usambaras, Uluguru, Udzungwa
There is a record of the species close to Iringa and from the Udzungwa Mountains National Park, but there are no other records of this species in this region. The Soutern Highlands Project reports that the species is present in Iringa and Morogoro regions, and northern Udzungwas. They also report a road killed mongoose near the east Usambaras. There is a historical record from Ulanga district around Morogoro (Rees 1964).

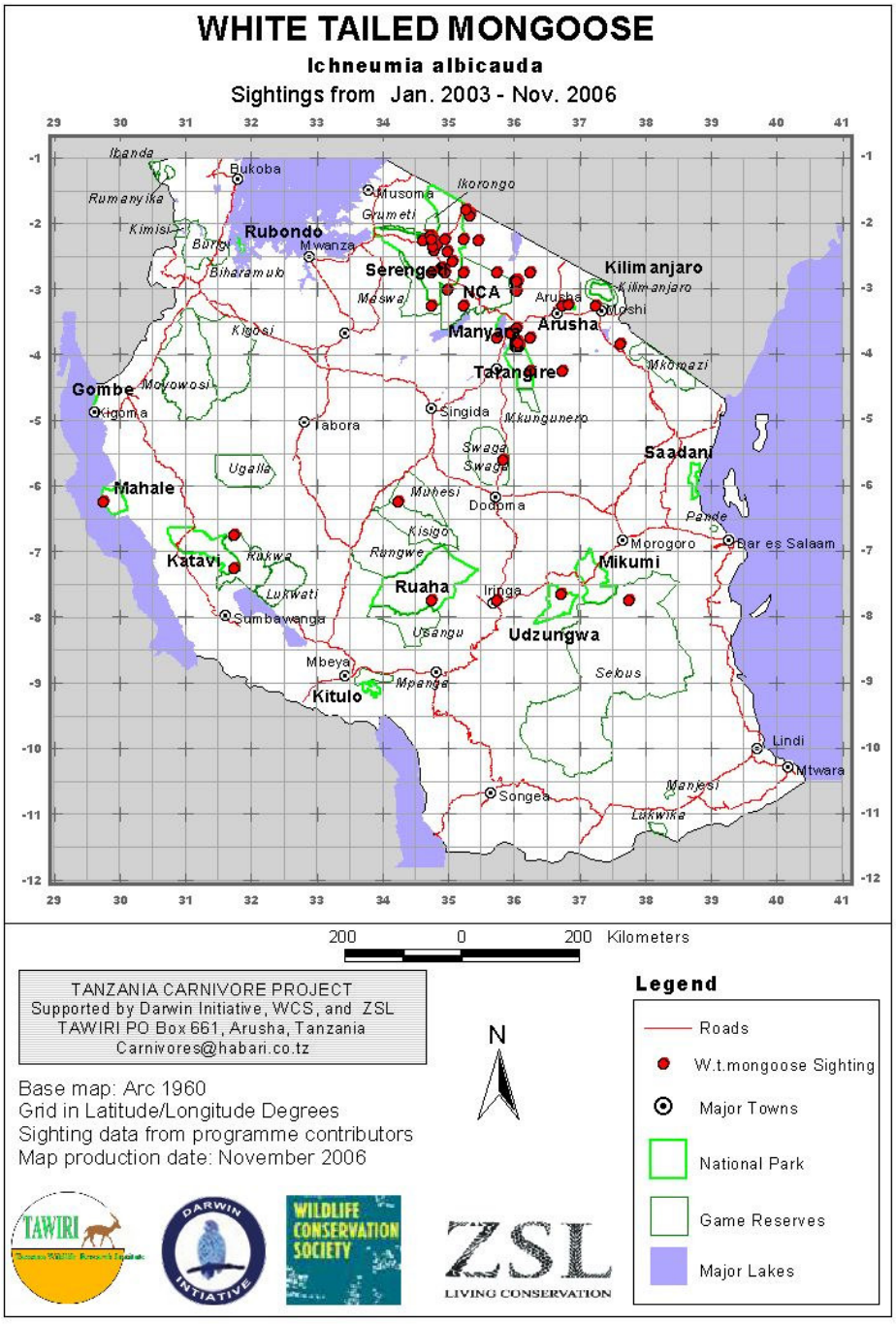

Fig. 45 Map of known sightings of the white tailed mongoose submitted to the Tanzania Carnivore Project since 2002 up until the time of the workshop. Data submitted are in two forms, either as direct GPS locations, or as a grid square as identified on the map. The former data type are plotted on the map directly, whilst the latter data type are plotted at the centre of the reported grid square.

4.24 Egyptian mongoose: Summary of current knowledge

Insert photo – from cf? Fig 46

Scientific name: *Herpestes ichneumon*
Names in use in Tanzania: Egyptian mongoose, Ichneumon (English)
CITES: Not listed.
IUCN Red list: Least concern (1996), population trends not listed.

Physical description
The Egyptian mongoose is also known as the large grey mongoose, or Ichneumon. It is a large mongoose with a wide distribution. The coat is a grizzled grey with a consipcous black tassel on the tail, which tends to be held up when moving. The species adopts a low slung reptilian gliding gait when moving, with the legs partly hidden by body fur. Head and body length is 48-60cm, tail length 33-54cm and weight ranges from 1.7-4kg (Kingdon 1977). The feet have five digits, but the first digit is very small, and usually doesn't show in spoor. Males are only slightly heavier than females. The dental formula is 3/3-1/1-4/4-2/2=40.

Ecology
Egyptian mongooses are widely distributed across savannah habitat but tend to be associated with riparian conditions (Skinner and Smithers 1990). Their diet incudes mainly rodents and other small mammals, but also frogs, reptiles, crabs, eggs and sometimes fish. Insects are often an important component of their diet, including beetles and termites. Larger prey are also important, including birds. Prey are caught when encountered whilst walking in dense habitat. It does not climb, unlike the slender mongoose. It has been reported as using a distinctive tail chasing behaviour to attract and lure prey (Kingdon 1977). It is also a powerful digger and will often dig to find prey.

The species is usually solitary or in pairs, however there are several observations of large groups and up to seven individuals have been seen foraging together in Spain (De La Fuente 1972). There is little information on the species in East Africa; however dung deposits seem to be used less than some other viverrids. The mongoose is usually diurnal, and is seldom seen at night, overnighting in termitaries, culverts and natural crevices. There is little information on mating behaviour, social systems, or range size, however it does appear that the species forms at least temporary pair bonds and shares the rearing of young (Ben-Yaacov & Tom-Tov 1983). It has been suggested that they live in polygunous families of oen male with up to three females and cubs (Smithers). They mark their home ranges with anal glad secretions on items such as big stones situated near habitually used trails. Permanent latrines are used by all family members to mark home ranges (Ben-Yaacov & Yom-tov 1983).

The mongoose is not generally regarded as a problem around poultry – possibly because of its diurnal habits.

Mortality and reproduction
There is little information on mortaility and reproduction. They are thought to have a birth season, and a gestation of 60 days and mean litter size is 3.3 (range 1-4 n=10) (Skinner and Smithers 1990). Pups first appear outside the nesting place at about 6 weeks. Their eyes are close when first born, and react to movement around day 21 and sound on day 25, suggesting a slow development relative to the other mongooses. At four weeks they are fully mobile, and they remain with their family until one year or older (Skinner and Smithers 1990). The species has lived up to nearly 13 years in captivity. They have been shown to have antibodies for two types of rickettsia in Kenya (Heisch et al 1962) and a pneumonic virus which can affect humans has also been found in this mongoose (Wier and Horsefuall 1940).

Distribution and habitat

The species is widespread across savannah habitat, and occurs across much of Africa, except the dense forest zone of central Africa and the deserts in the north, southwest and the horn of Africa. Its distribution extends into the coastal belt in North Africa and southern Europe and countries bordering the eastern mediterranean. There is no information on density anywhere in its range in sub-Saharan Africa. It is thought to be widespread across Tanzania. The species is not seen frequently and so there are not many records from the Tanzania Carnivore Atlas project database.

Northern region - Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi
The species has been documented in the Serengeti National Park, in the central area, but not in the North and towards the West. There are records of the species around Olduvai Gorge at the northern border of Ngorongoro Conservation Area and Serengeti National Park, and at Ndutu. The species has not been recorded in Grumeti, Ikorongo and Maswa Game Reserves. Outside the Serengeti protected areas there is only a single record of the species, which is to the southeast of Lake Natron. There are no records of the species in Kilimanjaro and Arusha National Parks, nor in Mkomazi Game Reserve, although there are historical records in Mkomazi (Eltringham et al. undated) and Kilimanjaro forest (Grimshaw et al. 1995).
Maasai steppe - Tarangire, Manyara, Simanjiro, Mkungunero.
The species has been recorded in the north of Tarangire National Park, and to east of the park on the Maasai steppe. It has not been recorded in Lake Manyara National Park or elsewhere in this region.
North west and central region - Ugalla, Mahale, Minziro, Bukoba, Rubondo, Singida, Dodoma, Tabora, Moyowosi/Kigosi.
The species has been recorded in Mahale Mountains National Park and north east of Kgoma, towards Moyowosi, but nowhere else in this region.
Rukwa-Lukwati - includes Katavi, Ruaha, Rungwa, Lwafi
The species has been recorded in Kisigo and Rukwa Game Reserves, and Katavi National Park. It has not been recorded elsewhere in this region.
Selous-Niassa - includes Mikumi, Lindi
There are no records of the species in this region
Coast - includes Mtwara, Zanzibar and Saadani
There are no records of the species in this region.
Southern highlands - includes Mbeya, Rungwe, Kitulo, Mpanga/Kipengere
There are no records of the species in this region.
Eastern arc mountains - includes Usambaras, Uluguru, Udzungwa
There are no records of the species in this region from the carnivore atlas, however the Southern Highlands Project reports that the species is likely to be present in the Udzungwas on the basis of interviews, and in Iringa and Morogoro region.

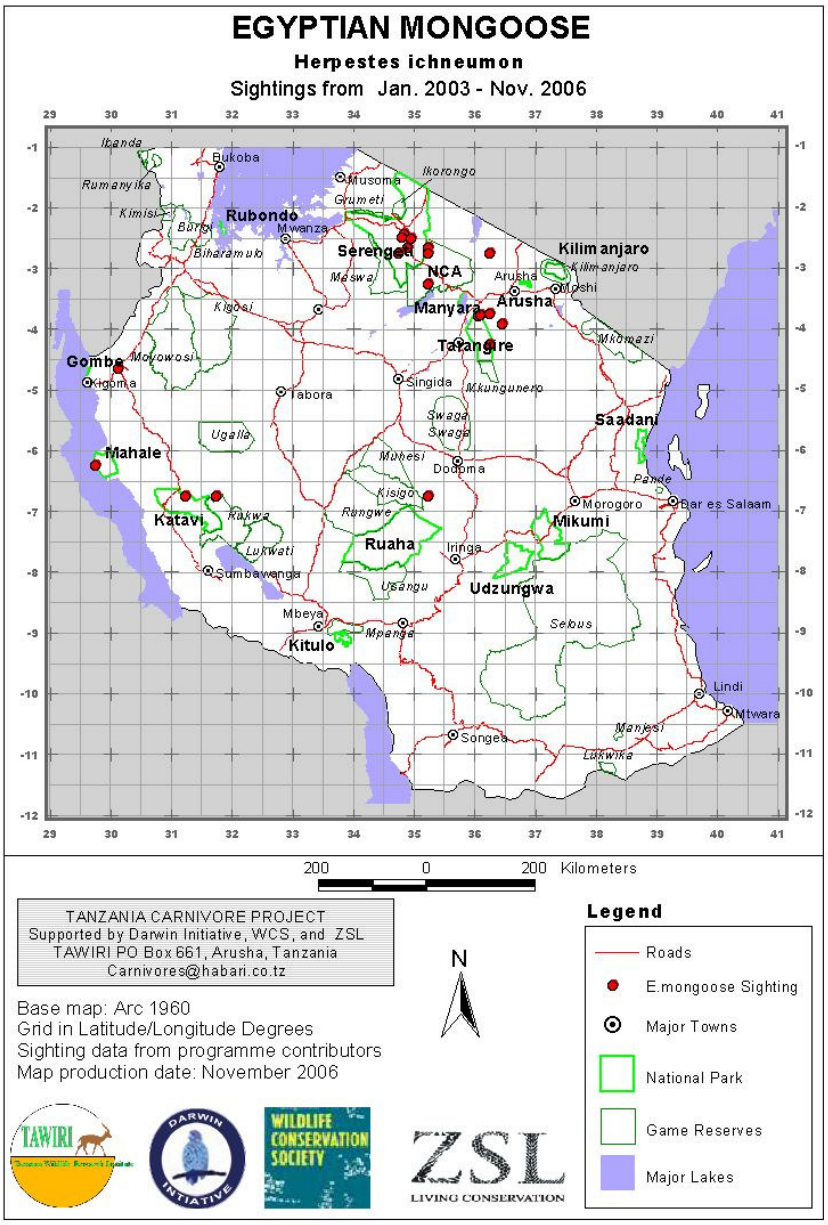

Fig. 47 Map of known sightings of the Egyptian mongoose submitted to the Tanzania Carnivore Project since 2002 up until the time of the workshop. Data submitted are in two forms, either as direct GPS locations, or as a grid square as identified on the map. The former data type are plotted on the map directly, whilst the latter data type are plotted at the centre of the reported grid square.

4.25 Marsh mongoose: Summary of current knowledge.

Insert photo – fig. 48

Scientific name: *Atilax paludinosus*
Names in use in Tanzania: Marsh or water mongoose (English)
CITES: Not listed.
IUCN Red list: Least concern (1996), population trends not listed.

Physical description.
The Marsh mongoose is also known as the water mongoose. It is another large mongoose with a wide distribution, but is more highly specialised than many of the other mongooses and is dependent on water. The coat is brown with a sprinkling of black guard hairs, sometimes with a greyish tinge, and the fur is long and shaggy. The head is usually lighter than the back and the underparts are paler. It is heavily built. Head and body length is 46-62cm, tail length 32-53cm and weight ranges from 2.5-4.1kg (Kingdon 1977). Despite its aquatic habits, its feet lack webbing. The feet have five digits, but the first digit is very small, and doesn't show in the fore foot in spoor, and only shows in the hind foot if the ground is soft. The four main digits are very long and

tend to splay on soft ground, giving it a characteristic and distinctive bird-like appearance. Males and females are of equal weight. The dentition is 3/3-1/1-4/4-2/2=40. They have three main vocalisations which are used frequently, a bray produced during mating and agonistic encounters, a grizzle produced curaing distress or warning, and humpf produced for attention or appeasement. All these calls are highly variable.

Ecology

Marsh mongooses are found in a variety of habitats, but are seldom far from water sources which tend to be bordered by dense vegetation (Rosevear 1974). It has been recorded at an altitude of 2,500m (Kingdon 1977). Favourite haunts are marshes, reedy steambeds and tidal esturaries. The species is an excellent swimmer and diver. It is thought to be particulary adapted to Papyrus swamps (Kingdon 1977). Such habitats have a restricted biodiversity due to the deoxygenated water, and harbour organisms specialised to these conditions, including air breathing lung fish, *Protopterus* and cat fish, *Clarias*, frogs, insect larvae and snails, all of which are food for the marsh mongoose. More recently it has been feeding on the introduced Louisiana crayfish which are becoming increasingly widespread across East Africa. The species forages around water and along borders of streams and marshes. Its diet covers the specialist creatures found in papyrus, but also the wide range of the animal life that is found in foraging areas, regular foods include mussels, crabs, fish, frogs, snakes, eggs small rodents and fruit (Kingdon 1977, Rosevear 1974). It extracts prey from holes and crevices, systematically working its hands through mud. It will throw creatures with shells such as snails and crabs against hard surfaces to break the shells and has favourite rocks which it uses for this purpose (Kingdon 1977). It will also take offal found at fishing villages. There are conflicting records of the species being diurnal, crepuscular and nocturnal (Nowak 2005, Rowe-Rowe 1987).

Dung are deposited at dung sites in open areas, generally near the waters edge. It also marks with its anal gland, usually in a hand stand position, and urinates and cheek rubs (Skinner and Smithers 1990). The species is able to eject foul smelling fluid from anal sacs that it uses in self defence (Kingdon 1977). It is solitary (Baker 1998), and it has been suggested that it is territorial (Kingdon 1977).

Mortality and reproduction

There is little information on mortality and reproduction.The young are probably born in burrows in stream banks or on mounds of vegetation among reed beds (Nowak 2005). There is no evidence of a breeding season in East Africa. The gestation period is 69 -80 days (Baker 1992), and litter size ranges from 1-3, but is usually 2 or 3. The young open their eyes at 9-14 days and are weaned at 30-46 days, reaching adult size at approximately 27 weeks (Baker 1992, 1998). The longest lifespan recorded is in captivity, and is just over 19 years (Nowak 2005). There is no information on disease in this species.

The species is hunted because it is reputed to be a poultry thief, and its habitat has declined drastically.

Distribution and habitat

The species is widespread but confined to an area south of the Sahara and excluded from the drier areas in the horn of Africa and to the southwest. Density in the Serengeti National Park has been estimated as between <0.1 and 4.3 per km^2 (Waser 1980). It is documented as being widespread across Tanzania (Kingdon 2004, Skinner and Smithers 1990), however it is not seen frequently and so there are not many records from the Tanzania Carnivore Atlas project database, although the distinctive nature of its spoor make it easier than the other mongoose species to identify by secondary sign.

Northern region - Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi

The species has been documented once in the Serengeti National Park, around simba kopjes. There is also a record of the species on the northern boundary of Ngorongoro Conservation Area towards Lake Natron. The species has not been recorded in Grumeti, Ikorongo and Maswa Game

Reserves nor outside the protected area system. There is a record of the species in Arusha National Park, but not in Kilimanjaro National Park, nor in Mkomazi Game Reserve. There are some historical records. SD saw the species once near Soit le Moytonyi in the Serengeti National Park in the early 1990s, and the species was reported to be well distributed in Ngorongoro Conservation Area in the 1960s (Ole Saibull 1966).

Maasai steppe - Tarangire, Manyara, Simanjiro, Mkungunero.

The species has been recorded in the south of Tarangire National Park, there are no other records of the species elsewhere in this region, including in Manyara National Park.

North west and central region - Ugalla, Mahale, Minziro, Bukoba, Rubondo, Singida, Dodoma, Tabora, Moyowosi/Kigosi.

The species has been recorded in Moyowosi Game Reserve, Rubondo Island National Park and Minziro Forest reserve, and there is a sighting to the east of Dodoma, but it has not been recorded elsewhere in this region. In an extensive survey of Minziro Forest Reserve the species was recorded 5 times out of 1,503 camera trap days.

Rukwa-Lukwati - includes Katavi, Ruaha, Rungwa, Lwafi

The species has been recorded in Kisigo-Muhesi and Rukwa Game Reserves and Katavi National Park. It has not been recorded elsewhere in this region.

Selous-Niassa - includes Mikumi, Lindi

The species has been recorded in the north east of the Selous Game Reserve, at Chada camp, but there are no records from Mikumi National Park or elsewhere in the region. There are historical records from Kilombero valley (Starkey 1997).

Coast - includes Mtwara, Zanzibar and Saadani

The species has been recorded about 100km to the west of Saadani National Park, however there are no other records of the species in this region.

Southern highlands - includes Mbeya, Rungwe, Kitulo, Mpanga/Kipengere

There are no records of the species in this region.

Eastern arc mountains - includes Usambaras, Uluguru, Udzungwa

The species has been recorded within the Udzungwa Mountains National Park, and slightly outside the park to the southwest. It has also been recorded close to Iringa, but there are no other records from this area. The southern highlands project report that the species as present in the Udzungwas and in Iringa and Morogoro regions, and probably in Rungwe Game Reserve and Kitulo National Park. There are historical records of the species in the east and west Usambaras (Rodgers and Homewood 1982).

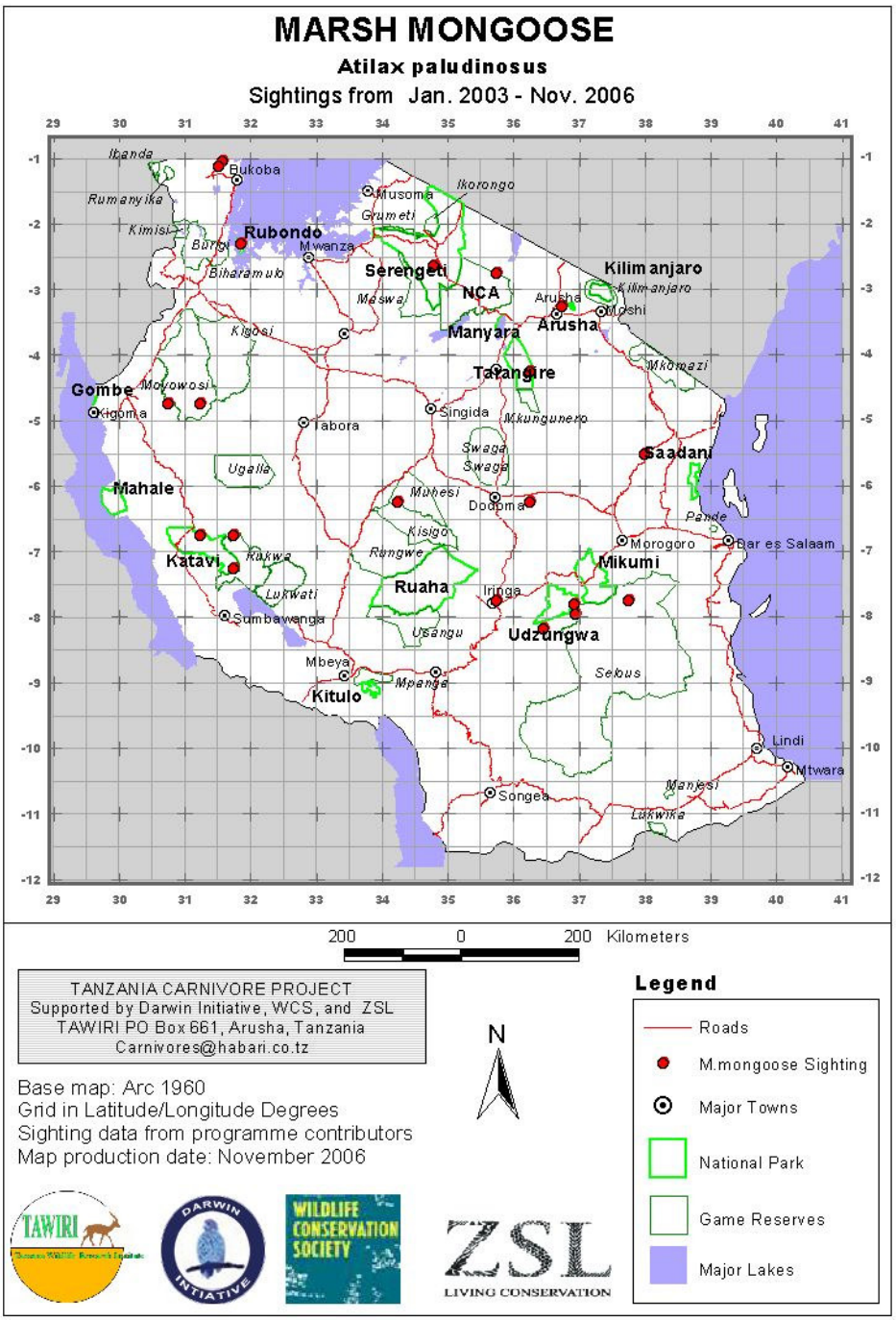

Fig. 49 Map of known sightings of the Marsh mongoose submitted to the Tanzania Carnivore Project since 2002 up until the time of the workshop. Data submitted are in two forms, either as direct GPS locations, or as a grid square as identified on the map. The former data type are plotted on the map directly, whilst the latter data type are plotted at the centre of the reported grid square.

4.26 Meller's mongoose: Summary of current knowledge

Insert photo – fig. 50

Scientific name: *Rhynchogale melleri*
Names in use in Tanzania: Mellers mongoose (English)
CITES: Not listed.
IUCN Red list: Least concern (1996), population trends not listed.

Physical description
Mellers mongoose is a poorly known mongoose, with a yellowish brown coloration, paler undersides and head, and dark feet. It has coarse black guard hairs protruding from close underfur and a bushy tail which is heavily outlined in black when fluffed out. It is similar in appearance and build to the white tailed mongoose, but with a much shorter and blunter muzzle. There is

considerable variation in tail colour in this mongoose, and there are morphs with pale tails, adding to the confusion with the white tailed mongoose. Hind soles are hairy to the roots of the toes. Head and body length is 44-48cm, tail length 28-40cm and weight aerages 2.5kg, and ranges from 1.7-3kg (Kingdon 1977). The feet have five digits, but the first digit is very small, and does not show in the spoor of either fore or hind foot. The hind foot is clearly much larger than the fore foot. Males are slightly lighter than females, although they are roughly the same size. The dentition is 3/3-1/1-4/4-2/2=40. Nothing is known of the vocalisations of this species.

Ecology

Mellers mongooses are restricted to the woodland belt and to moister and more heavily grassed or wooded areas such as drainage lines and rocky outcrops (Kingdon 1977). What little information there is, suggests that the species is terrestrial, nocturnal and solitary. The diet includes wild fruit, termites and probably small vertebrates. It has been suggested that the species is associated with termitaria, macrotermes and Hodotermes spp., which have been suggested to be their principal food (Skinner and Smithers 1990). Support for this conjecture comes from an analysis of the stomach contents of 23 stomachs of Mellers mongoose wild caught in Zimbabwe, which were comprised nearly entirely of these termite species. Other diet items in this analysis were orgoptera, reptilian, myriad poda, coleopteran and amphibians (Skinner and Smithers 1990). Another stomach from a Mellers mongoose in eastern Zambia contained only termites and two centipedes (Ansell 1965).

Mortality and reproduction

There is little information on mortality and reproduction. Litter sizes of 2-3 have been recorded (Nowak 2005). There is no other information on this species.

Distribution and habitat

The species has a limited and sporadic distribution centered around what appear to be four discrete populations, one in eastern South Africa, the second in a band through Central Zimbabwe stretching in a narrow strip through Mozambique to the coast, the third from Zambia, Southern Malawi and Central Mozambique, and the fourth in Tanzania on the Maasai steppe (Skinner and Smithers 1990). Kingdon (1977) documented the species from just east of Shinyanga, and east and west of Morogoro, but suggested that quite a large area of Tanzania might be suitable habitat. They are nowhere common throughout their range; however the apparent lack of continuation between different parts of their range may be due to a lack of knowledge about the species presence (Skinner and Smithers 1990). The Carnivore Project has received only 3 records of the species, only two of which can be confirmed.

Northern region - Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi

The species has been documented once close to the eastern boundary of the Serengeti National Park, around Soitorgoss. Whilst this record was submitted by a very experienced naturalist, it is not completely certain and needs verification. If valid, this would present a significant range extension.

Maasai steppe - Tarangire, Manyara, Simanjiro, Mkungunero.

There are no records of the species in this region.

North west and central region - Ugalla, Mahale, Minziro, Bukoba, Rubondo, Singida, Dodoma, Tabora, Moyowosi/Kigosi.

There are no records of the species in this region.

Rukwa-Lukwati - includes Katavi, Ruaha, Rungwa, Lwafi

There is a single record of the species found dead on the road near Muhesi Game Reserve from Neil Baker. The specimen was photographed and was agreed to be most likely a Mellers mongoose. The range is close to the range conjectured by Kingdon (1977).

Selous-Niassa - includes Mikumi, Lindi

The species has been recorded close to the boundary on the western side of the Selous Game reserve towards the Udzungwa Mountains National Park, by the Southern Highlands Project in a camera trap survey. There is a historical record from the Kilombero Valley (Starkey 1997).

Coast - includes Mtwara, Zanzibar and Saadani

There are no records of the species in this region.

Southern highlands - includes Mbeya, Rungwe, Kitulo, Mpanga/Kipengere

There are no records of the species in this region.

Eastern arc mountains - includes Usambaras, Uluguru, Udzungwa

There are no records of the species in this region from the Carnivore Atlas Project, however the Southern Highlands Project suggests that the species is present in Iringa and Morogoro regions, and in the Udzungwa Mountains National Park.

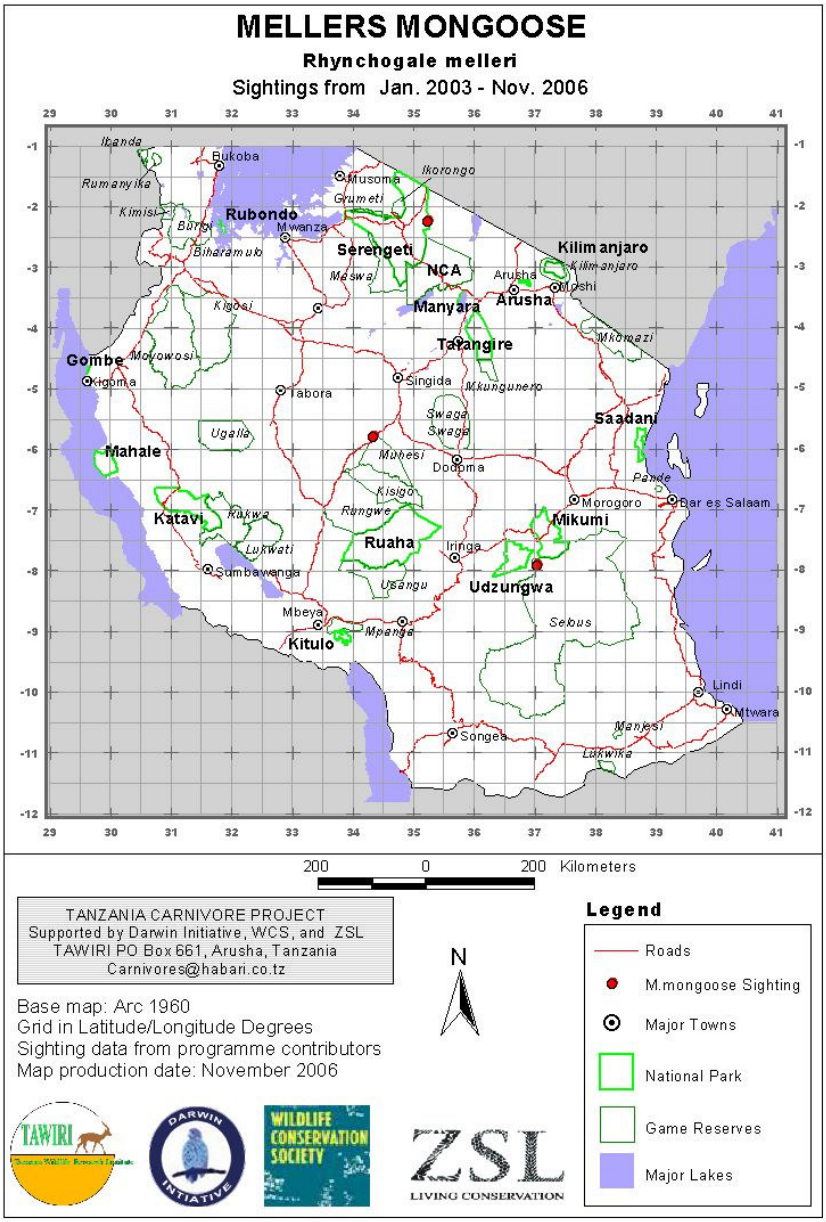

Fig. 51 Map of known sightings of Mellers mongoose submitted to the Tanzania Carnivore Project since 2002 up until the time of the workshop. Data submitted are in two forms, either as direct GPS locations, or as a grid square as identified on the map. The former data type are plotted on the map directly, whilst the latter data type are plotted at the centre of the reported grid square.

4.27 Bushy tailed mongoose: Summary of current knowledge

Insert photo – from camera traps fig 52

Scientific name: *Bdeogale crassicauda*
Names in use in Tanzania: Bushy tailed mongoose (English)

CITES: Not listed.
IUCN Red list: Least concern (1996), population trends not listed.

Physical description
This is a smaller mongoose, and very little known. There is considerable variation in colour, but the predominant general colour is some shade of grey or brown with black legs. The legs are relatively long. 4 females and 3 males from Zimbabwe measured 69.5(67.2-72.0)cm and 69.3(65.5-74.0)cm respectively total length, 24.9(23-26.5)cm and 25.9(22.9-28.5)cm tail length and 1.57 (1.34-1.77)kg and 1.93(1.82-2.10) kg weight (Skinner and Smithers 1990). All Bdeogale mongooses have only 4 digits on both fore and hind feet. There are several subspecies, two of which are found in Tanzania, one is found only on Zanzibar: *B. c. tenuis*, which is smaller and darker than the mainland form, the other is *b. c. crassicauda*. The dental formula is 3/3-1/1-4/4-2/2=40.

Ecology
The species has been described as rare, unspecialised, nocturnal, insectivorus and solitary (Taylor 1986, 1987). It inhabits woodland and moist savannah, whilst the other members of the same genus live in tropical forests. However so few specimens have been caught or identified it is difficult to be sure about the species' habitat requirements. The Zanzibar subspecies feeds almost entirely on insects, especially ants and termites, but may also take crabs and rodents. Stomach analysis shows that the species consumes insects, reptiles, amphibians, murids, myriapods, Ranae, Scorpions, Gastropods and some grass. The insects include termites, orthoptera, grasshoppers, coleoptera. Reptiles include variable skink, kirks rock agaman, common house snake, amphibians included the red toad and common toad, Bocages burrowing fog, the savannah ridged frog and the Mozambique ridged frog. Muridae were multimmate mouse, *myriapoda* were millipedes, *Aranae* the baboon spider, and *cateropods* the slug. This suggests that the bushy tailed mongoose is probably predominantly insectivorous, but it will eat other invertebrates, small mammals and repties (Skinner and Smithers 1990).

Mortality and reproduction
Little is known. A Bushy tailed mongoose was found in the stomach of a Vipera rhinoceros (Peters 1852).

Distribution and habitat
The published distribution documents the species as being confined to Zanzibar, and in a strip from the south western border where Lake Malawi meets Mozambique up to just south of the Moshi to Dar road, and then a spur to the west as far as Mount Meru and Kilimanjaro (Kingdon 1977). This range excludes Mkomazi Game Reserve. Most of the records within the Tanzania Carnivore Atlas are from camera trapping studies, and hence are very reliable, and show numerous range extensions (Fig. 53) which have fundamentally modified our understanding of the distribution of the species.

Northern region - Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi
The species has been documented in Ngorongoro highland forest during a camera trap survey in 2005 (6 sightings out of 915 camera trap days) and in Arusha National Park, again in a camera trap survey in 2006 (45 sightings out of 1073 camera trap days). The frequency of trapping in Arusha Park suggests it is common in this protected area. A previous study by Oikos using live traps also documented a fairly high trap rate for this species. There is a historical record from Mkomazi Game Reserve (Eltringham et al. undated).
Maasai steppe - Tarangire, Manyara, Simanjiro, Mkungunero.
There are no records of the species in this region.
North West and Central region - Ugalla, Mahale, Minziro, Bukoba, Rubondo, Singida, Dodoma, Tabora, Moyowosi/Kigosi.
The species was not seen in Minziro Forest Reserve during an extensive camera trap survey in the area, but it is listed on the Mahale National Park species list, and the latter was confirmed through a camera trap survey. (note sighting in Minziro on map is wrong -it will be corrected in final report)

Rukwa-Lukwati - includes Katavi, Ruaha, Rungwa, Lwafi

There is a record of the species from Katavi National Park, this record cannot be confirmed. There are no records from elsewhere in the region

Selous-Niassa - includes Mikumi, Lindi

The species has been recorded close to the boundary on the western side of the Selous Game reserve towards the Udzungwa Mountains National Park, by the Southern Highlands Project in a camera trap survey. Taylor (1986) records two specimens of this species captured within the Selous-Niassa corridor midway between the Selous and Lukwika Game Reserves, and Kingdon (1977) documents a couple of specimens from a similar area. Kingdon also documents a specimen captured just to the east of Lukwika Game Reserve (Kingdon 1977). There is a published record from the Kilombero Valley (Starkey 1997).

Coast - includes Mtwara, Zanzibar and Saadani

The species has been recorded in Zanzibar in Jozani Forest during a camera trap survey. There are no other records of the species from this area, however there are some historic records from the area just north west of Lindi and close to Pande Game Reserve (Kingdon 1977) and a recent record from the Mbarawala area near Lindi (Msuya et al. 2004).

Southern highlands - includes Mbeya, Rungwe, Kitulo, Mpanga/Kipengere

There are no records of the species in this region from the carnivore atlas project. Taylor (1986) recorded a specimen close to the northern border with Malawi, just south of Mbeya.

Eastern arc mountains - includes Usambaras, Uluguru, Udzungwa

There are records of the species from the Udzungwa mountains National Park, principally from camera trapping surveys conducted by the Southern Highlands Project and Francesco Rovario. There are published recent and historic records from the east and west Usambaras (Rodgers and Homewood 1982) and Amani nature reserve (Mercer 2000).

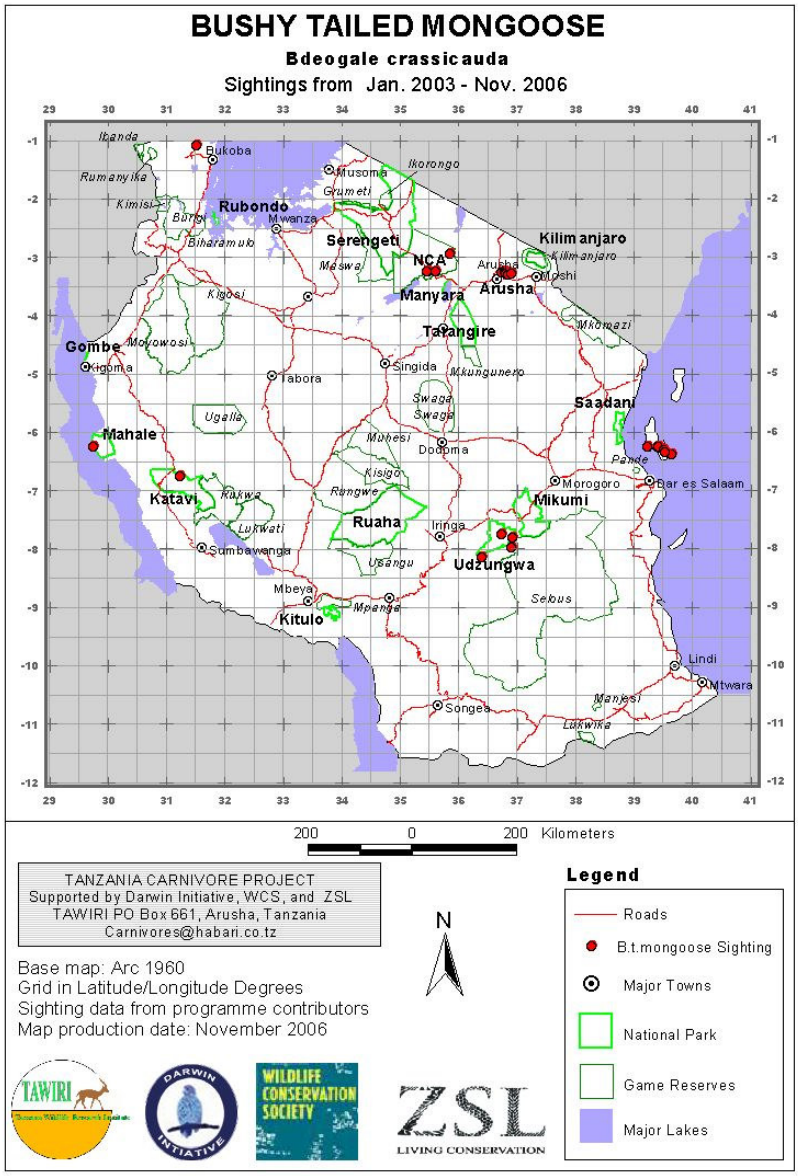

Fig. 53 Map of known sightings of Bushy tailed mongoose submitted to the Tanzania Carnivore Project since 2002 up until the time of the workshop. Data submitted are in two forms, either as direct GPS locations, or as a grid square as identified on the map. The former data type are plotted on the map directly, whilst the latter data type are plotted at the centre of the reported grid square.

4.28 Sokoke dog mongoose: Summary of current knowledge

Insert photo – if poss fig 54

Scientific name: *Bdeogale omnivora*
Names in use in Tanzania: Sokoke dog mongoose (English)
CITES: Not listed.
IUCN Red list: Endangered (B1+2c), 1996 (classified as subspecies, but now regarded as separate species). Population trend unknown.

Physical description
The Sokoke dog mongoose is a small mongoose, smaller than the bushy tailed but bigger than a slender mongoose. It has a pale cream coloured body and dark brown limbs and tail. The head and shoulders are palest and almost white (Kingdon 2004). Head and body length is 34-45cm, tail length 18-24cm and weight is estimated at around 0.7-1.6kg (Kingdon 2004). The dentition is the same as the other dog mongooses: 3/3-1/1-4/4-2/2=40.

Ecology
The species is very rare and is not much known. It is predominantly nocturnal. It has been documented in coastal forests, appearing to make use of evergreen thickets but ranging through a

mosaic of forest, savannah and cultivation. Not much is known about the diet, but the few specimens collected contained insects, birds and fruits.

Mortality and reproduction
Unknown

Distribution and habitat
The published distribution was, until recently, confined to Kenya, on a strip of coastal forest between the river Galana and Mombasa. There were previous records of the species from the east and west Usambara Mountains (Allen & Loveridge 1927); however until 2005, no recent observations there or elsewhere were reported. The authors noted that their skinners recognised the species from the Uluguru Mountains, although its presence has never been confirmed in this area. Of the two specimens collected by Allen and Loveridge, one was from Magamba, and the other from Magoroto. It was recently sighted in Tanzania, in the east Usambara Mountains at night on a trail from the Sigi visitor centre towards Chemka village (Goller 2005).

4.29 Jackson's dog mongoose: Summary of current knowledge

Insert photo – if poss fig 55

Scientific name: *Bdeogale jacksoni*
Names in use in Tanzania: Jackson's dog mongoose (English)
CITES: Not listed.
IUCN Red list: Vulnerable (B1+2c), 1994. Population trend unknown.

Physical description
The Jackson's dog mongoose is a medium sized mongoose, slightly larger than the bushy tailed. It has long fur, especially on the tail, which is pale and bushy, and very yellowish tints on the neck and throat (Kingdon 2004). Its legs are black, and its over all colour is pale greyish. Head and body length is 52-57cm, tail length 27-36cm and weight 2-3kg (Kingdon 2004). The dentition is the same as the other dog mongooses: 3/3-1/1-4/4-2/2=40.

Ecology
The species is very rare and is not much known. It is thought to be nocturnal and crepuscular. In Kenya it occurs in montane forests and bamboos zones, and in lowland forest immediately south of Mount Elgon, but it has only recently been discovered in Tanzania. Its diet mostly consists of army ants of the genus *Anona*; but it also eats caterpillars, beetles, millipedes, snails, lizards and snake eggs. The juveniles depend on rodents – about 80% of their diet compared with 5% in adults – as it is possible that coping with well defended columns of army ants may depend on maturity and learning (Kingdon 2004).

Mortality and reproduction
Unknown

Distribution and habitat
The published distribution was, until recently, confined to Kenya, on the Kenyan mountains and in lowland forest immediately south from Mount Elgon. It has recently been discovered in the Udzungwa Mountains National Park by the Southern Highlands Project during a camera trapping survey, and by Francesco Rovario during a similar survey. It is very localised and rare within the Matundu forest in this area.

4.30 Other species

Several other carnivore species have their ranges close to that of Tanzania and may be present in Tanzania. These include the desert dwarf mongoose, the long snouted mongoose, the Congo clawless otter and the golden cat.

4.4 How to get information on status: Available methods

There are several methods that can be used to survey small carnivores. Which method is selected for use depends on the questions that need to be addressed and the suitability of that method for a particular region (Norton-Griffiths 1978). Key methods appropriate for small carnivore surveys identified in this workshop include those identified in previous workshops, such as spoor counts, radio collaring, line transect surveys, tourist photos, detection dogs, questionnaires, camera trapping, baiting, records of attacks and visual search. Additional methods relevant to small carnivores are hair snares which can be used in combination with baiting; trapping, marking and releasing for mark-recatpure analysis; using sand traps to capture spoor when implementing a spoor count; and road kill counts. Call-in playbacksand tourist photos were dropped as they were deemed not relevant for these species. Each appropriate technique is discussed below, together with a list of their main advantages and disadvantages as agreed within the workshop.

4.4.1 Questionnaires

Questionnaire surveys of residents within a region can be used to collect information on small carnivore species in two key ways. Firstly, they can be used as a simple presence/absence survey, by gathering information from residents in an area on sightings. Secondly, they can be used as an in depth survey to not only gather information on distribution, but also to assess levels of conflict with people, threats and attitudes of residents to small carnivore species in their area. All data gathered through questionnaire surveys need to be interpreted with caution, as interviewees will not necessarily respond honestly and openly to questions. Furthermore, many of the small carnivores are difficult to identify even by trained experts, and hence identification of rare carnivores can seldom be depended on, however repeated observations of species with a limted distribution can help pin-point likely areas for in depth surveys.

Advantages

- Perhaps the only feasible method for mapping distribution at a national scale
- Relatively cheap
- Relatively low manpower demands
- Can be implemented by relatively unskilled field workers.
- Can provide extra information on potential threats – such as conflict with people.

Disadvantages

- Provides only very coarse data – cannot detect local changes in population density.
- Provides no information on other potentially important factors such as demographics, ranging patterns and disease.
- Requires highly skilled labour when combined within a GIS framework.
- There is cultural variation in veracity of responses to interviews and in levels of knowledge.
- Needs validation.

Points of information

- Time scales and area need to be clearly defined when implementing questionnaire surveys.
- All questionnaires need careful design and analysis, but particularly those looking at conflict and threats.

4.4.2 Spoor counts and sand trapping

In this method either spoor are recorded whilst walking along a track, or sand 'traps' are placed out, perhaps near bait, and spoor in the sand are recorded. For the larger species some tracking may be possible by vehicle, in which case the vehicle should be mounted with a specially modified chair on which a skilled tracker can be seated. Standard methods for density rely on the recording

of all spoor that is fresh (less than 24 hours old) seen on the track. In the case of sand traps these can be wiped clean every 24 hours, making it easier to interpret age of spoor. Such information can then be used to generate a spoor frequency, e.g. the number of kilometres travelled per spoor detected (Stander 1998), which can then be used as an index of density. The method can work for large carnivores, but is not without its problems, but is not much used for smaller carnivores. Partly this is because of the difficulties in unambiguously identifying spoor for some of the smaller species. Trackers need to be sufficiently trained to distinguish spoor accurately between the species.

Advantages

- Relatively easy to implement
- Can provide presence/absence data, but also relative abundance providing soil substrate and habitat similar, trends, and density if calibrated against a known density.
- Low technology
- Relatively cheap
- Trackers are in most cases available
- Can provide information about other species in the area
- Can be used in areas where animals are shy and hard to locate
- Can be used at all times of year

Disadvantages

- A suitable soil substrate required in order to detect spoor or sand traps need to be used to capture spoor
- The method is untested for all the species here
- Relies on a good network of roads and trails
- Requires well trained trackers
- Accurate species identification is almost impossible for some of the smaller carnivores.

4.4.3 Driven or walked transects

In this method transects are driven and all individuals seen of one or more target carnivore species are counted along the transect line. For optimum effectiveness distance based methods should be used (Buckland et al. 1993) whereby the distance of each individual or group seen from the transect line is recorded. The data can then be analysed with DISTANCE software and used to generate an estimate of overall density. The method relies on a sufficient number of groups of the target species to be seen and recorded – generally a minimum of 30 groups are needed for a reasonably accurate estimate of density. This makes it unsuitable for use in areas where target species are rarely seen or are very shy. Nocturnal species can be counted in the same way, but driving at night and using a spotlight to locate individuals.

Advantages

- Relatively easy to implement
- Can provide density estimates
- Can provide other useful data such as densities of other mammal species in the area
- Can provide information on habitat preferences

Disadvantages

- Will not work in areas where animals are very shy
- Will only work well in open areas – cannot be used in bushy areas where animals are difficult to see.
- Data analysis is complicated and requires training.

4.4.4 Detection dogs

In this method highly trained domestic dogs are used to find indirect signs, usually scat, in much the same way as dogs are used by the police to find narcotics. Scat can either be counted as in spoor counts (see above) to give a density estimate, or DNA can be extracted and typed to provide a unique genotype that can then be used in a mark-recapture analysis framework to provide a

more accurate estimate of density. The method has been used successfully in this way in the US to estimate population densities of several carnivore species, including kit foxes and grizzly bears (Smith et al. 2001; Smith et al. 2003; Wasser et al. 2004), however, aside from a training program conducted by the Serengeti Cheetah Project in Laikipia in July 2004, the method is largely untested in Africa. The training program demonstrated that it is possible to train Kenyan dogs to locate and distinguish wild dog and cheetah scat from other scat such as that from jackals, it is unlikely that scat from any of the carnivores species here would present a problem. The method may also be used to identify carnivore biodiversity in an area.

Advantages

- Potentially useful outside protected areas
- Can provide DNA for individual identification and hence accurate monitoring
- DNA samples can provide extra information – such as population structure
- Scat samples can provide extra information on diet
- Relatively cheap to implement (except when using DNA analysis).

Disadvantages

- Method untested in Africa
- Requires training of both dogs and handlers
- DNA analyses currently expensive and labour intensive
- Would require a change in permit regulations *if* used inside protected areas
- Requires good veterinary care
- Requires a dog with appropriate behavioural characteristics

Requirements

- Requires good safety protocols and pre planning
- Dogs require frequent breaks when working
- Dog needs to be bonded with handler

4.4.5 Camera traps

For this method cameras are positioned along animal trails which show active use, and linked to a beam that detects any changes in infrared in front of the camera, such as that which occurs when an animal moves along the trail. Whenever such a change is detected the camera takes a photograph, hence the expression 'camera trap', and in so doing produces photographic evidence of the carnivore community in an area. Photographs of many of the small carnivores can be used for individual recognition as each individual has unique markings, in the form of spots or blotches for genets and civets and stripes for banded mongooses. Once they are put in place, the cameras are generally left undisturbed for a minimum of two months, except for battery checks and changing film. The method works best for individually recognised animals, where a library can be established of individuals within an area. Mark recapture analysis is then used to estimate population size. The technique has been very effective for surveying tigers and jaguars (Karanth & Nichols 1998; Silver et al. 2004). The method works best in forest and for species with relatively small home ranges.

Advantages

- Useful in forested areas where visibility is poor and most of the other methods difficult to implement
- Can provide accurate density estimates when using individual recognition.
- Can provide useful other additional information such as the carnivore and prey community in an area.
- Can provide information on shy and nocturnal species which are not normally seen.
- The photographs generated are useful for local, national and international PR, and hence provide extra conservation benefits.

Disadvantages

- Set up equipment is costly and can only be used in relatively secure areas, otherwise likely to be stolen.

- Equipment is very sensitive to weather – if it rains a lot or it is very hot, then this can cause the equipment to malfunction.
- Cameras require frequent checking, particularly in savannah areas, because of a high density of primates and ungulates.
- If used with bait it can attract non target species which can use up film.

4.4.6 Visual search

This method relies on an observer locating individuals of one or more target species from a vehicle without using aids such as radio collars but by relying entirely on visual cues such as via binoculars or spoor. Since many species are largely nocturnal and cryptic, relying on visual search may be problematic for generating sufficient information for monitoring. However it has been used successfully for monitoring banded mongoose (cite Daniela) and serval (cite Aadje).

Advantages

- Can provide important distribution data
- Not labour intensive

Disadvantages

- Unlikely to work in areas where animals are shy
- Habitat dependent – requires good visibility
- Data are biased towards well visited areas with good visibility
- It is difficult to provide good information at the population level except in a few open areas (e.g. Ngorongoro crater) and for a few species (e.g. servals and otters).

4.4.7 Radio collaring

With this method VHF, GPS, mobile phone or Satellite collars are fitted to an individual of a target species to enable relocation or recording of position. For most such collars, the collar allows subsequent relocation of the collared individual, due to a signal transmitted from the collar, either to a VHF receiver, via a mobile phone receiver or via a satellite. Some GPS collars do not transmit a constant signal, but store GPS reference points visited by the animal, at a set rate (once, twice or several times a day) and transmit a signal only when they drop off after a set time, to allow them to be located and the data retrieved and downloaded to a computer. In order to fit the collar the individual first has to be captured. With many small carnivores this can be done using live traps, and does not involve immobilisation.

The method allows the collection of accurate data on ranging patterns that are not biased by habitat visibility, unlike methods relying on visual relocation. This method also provides accurate estimates of density for for strongly territorial species.

Advantages

- Can provide a huge amount of data, not only on population size, but also on disease monitoring, ranging patterns, identification of threats to the population and demographic information including birth and survival rates
- Relatively low manpower demands
- Density estimation is most accurate for territorial species without overlapping home ranges as generally territory size is used to estimate density.
- Provides good information on movements including habitat use, avoidance/attraction to people/livestock etc., particularly when used in a GIS framework

Disadvantages – only if using satellite and GPS collars

- Makes use of relatively complicated technology – and hence implementation requires some training.
- Relatively expensive
- Some satellite/GPS collars may require substantial support from manufacturers including further costs for data downloads
- Some species are difficult to trap in order to fit radio collars.
- Requires a well-trained veterinarian to minimize any potential risks of immobilization

- Not popular with tourists in well visited areas unless accompanied by good PR

Recommendations

- Collar should be as light and inconspicuous as possible

4.4.8 Records of attack

Records are kept by Wildlife Division in Dar and at district level on any reports of attacks on people and livestock. The main problem with these records is that reporting is seldom consistent between and within regions, especially for livestock attacks and there are unlikely to be any records for the main source of conflict for the small carnivores - poultry.

Advantages

- Coarse indication of presence
- Indicate conflict hotspots
- Centralised record keeping (data are available at WD and district offices)

Disadvantages

- Records of livestock attacks are under reported and inconsistent and difficult to interpret (could be under or over reporting)
- There are cultural variations in reporting (e.g. Maasai under report attacks)
- Absence of reports does not necessarily imply absence of conflict hotspot
- Problems in species identification for small carnivores
- Currently no system in place for recording attacks by small to medium carnivores.

4.4.9 Baiting and/or hair snares

This technique uses bait to attract a target small or medium carnivore species to an area for research and information - not for hunting. A well designed baiting survey in an area where animals are attracted to bait can yield information on numbers and density if combined with individual recognition of the animals coming to bait and a total count, either through visual means or via DNA extracted from hair snares. It can also yield information on presence when not used in a rigorous design or without individual recognition.

Advantages

- Establishes presence
- Repeated baiting in an area over several sites can provide information on trends and allow monitoring of individuals
- May attract other carnivores which can provide useful information about the carnivore community

Disadvantages

- There are potential consequences of conflict for local people if not planned carefully
- Could be ineffective in many areas, particularly those with a history of poisoning
- Species identification from hair can be difficult – requires a hair library and microscope or DNA extraction and genetic analysis – both require well trained personnel.
- There is a limited ability to target particular species, although some scents can be quite species specific.

4.4.10 Den, midden and spraint counts

In this technique den, midden and/or spraint sign are recorded in an area. Many of the small and medium carnivores scent mark, often in well marked latrines or middens, and/or use dens, which can often be located more easily than the individual animals, particularly for nocturnal species.

Advantages

- Can provide information on presence and absence.
- Can provide an index of abundance – particularly for otters and civets
- Relatively cheap

Disadvantages

- Difficulty in distinguishing dens of different species

4.4.11 Road kill counts

In this technique individual carnivores seen killed on a road are identified by species and recorded.
Advantages
- Can provide information on carnivore presence across the country.
- Relatively cheap.
- Can provide tissue for DNA and specimens for collections.

Disadvantages
- Depends largely on tarmac road coverage.

4.4.12 Mark-recapture

In this technique animals are trapped using standard trapping protocols then marked and released and re-trapped at a later date. The proportion of marked individuals re-trapped is then used to estimate population size using mark-recapture statistics. The method was developed for small mammals, and can provide accurate estimates of density. Live trapping, without marking, can also give a good indication of biodiversity in an area.
Advantages
- Useful in forested areas where visibility is poor and most of the other methods difficult to implement
- Can provide accurate density estimates.
- Can provide useful other additional information such as other carnivores in an area
- Useful for species without distinctive individual coat patterns that cannot be recognised in a camera trap survey protocol
- Can provide information on disease and genetics if tissue samples are obtained

Disadvantages
- Method has not been shown to work for all species.
- Some species can be trap shy.
- Traps need to be strong enough to withstand large predators

5. CONSERVATION THREATS

In this session the group examined potential threats to small to medium conservation in Tanzania. The group identified the threats for the species group as a whole and discussed the evidence for each threat for each species and its significance to populations. The threats fell under 7 major categories: Prey availability; land use change; anthropogenic killing; Inadequate management; Disease; tourism; domestic animals; interspecific competition. Interspecific competition is a feature of natural ecosystems, and so the latter category is a constraint, rather than a direct threat. Here we go through each threat category together with associated subcategories, and identify which species are subject to each threat. This information is supported with evidence from the published literature.

5.1 Prey availability

5.1.1 Termite distribution change

Species susceptible: Bat eared fox, possibly Meller's mongoose.

5.1.2 Loss of prey

Species susceptible: All species especially prey specialists such as cats, striped weasel and otters.

5.1.3 Decline in scavenging opportunities

This is potentially important for species dependent on scavenged meat.
Species susceptible: No species entirely dependent on scavenging – but Jackals may be affected (ref?)

5.2 Land use change

5.2.1 Reduction in habitat quality – degradation of natural habitat

Species susceptible: All species with some exceptions – these are human tolerant species which thrive in human altered land including civet, common genet, palm civet and side-striped jackal, possibly slender mongoose, white tailed mongoose and wild cat. There is a need for further information about the benefits and costs of habitat change to different species.

5.2.2. Habitat conversion (either due to deliberate land use change or inadvertent due to flooding or lowering of water table)

Species susceptible: All species are potentially affected – but the specific impacts depend on the type of conversion e.g. conversion to pine plantation or urban use is likely to have more impact than conversion to agriculture.

5.2.3 Resource extraction

Species susceptible: Impacts depend on the extent of resource extraction – sustainable resource extraction need have no or very limited impact. However if resource extraction is not sustainable and leads to habitat change it will have impacts similar to an overall reduction of habitat quality. It may have additional effects if it results in more people becoming resident in areas, including noise, use of dogs etc. which can affect all species.

5.2.4 Fragmentation

Species susceptible: Forest dependent species are particularly affected by habitat fragmentation (because agricultural land is more similar to savannah than forest).

Bushy tailed mongoose, servaline genet, palm civet?, jackson's mongoose and sokoke dog mongoose

5.2.5 Pollution includes pesticides/herbicides/rubbish
Species susceptible: All species particularly the otters

5.2.6 Global warming
Species susceptible: All species but particularly those which are habitat specific, bushy tailed mongoose, Jackson's mongoose, Sokoke dog mongoose, servaline genet, striped weasel.

5.2.7 Fire management
Species susceptible: Indirect impacts will affect similar species as those affected by a reduction in habitat quality, there is a need for more information on the direct impacts of fire.

5.3 Anthropogenic killing

5.3.1 Road kill
Species susceptible: Forest species are probably less likely to be affected, whilst smaller carnivores are probably most affected including civets, white tailed mongoose, genets, zorilla, striped weasel. Golden jackals and servals are probably also affected, but to a lesser degree.Tarmac roads pose more of a threat than earthen roads.

5.3.2 Mistaken identity
Species susceptible: servals can be mistaken for leopards, marsh mongoose can be mistaken for otters.

5.3.3 Medicinal use
Species susceptible: Otter parts are used as an aphrodisiac (widespread across cultural groups), and bands of otter skin are used on babies to protect against witchcraft (hehe); The honey badger is eaten in the belief that it will make the consumer tough in fighting (in the Udzungwa area).

5.3.4 Cultural use
Species susceptible: striped weasels are used to protect a shamba from 'theft' (nyakyusa, safwa, sangu); serval cat skin is used by local doctors and ceremonial dancers for traditional clothing.

5.3.5 Illegal hunting
Species susceptible: As for cultural and medicinal. Carnivores are hunted for food by particular cultural groups, such hadzabe, hehe. The palm civet particularly targeted in the Iringa and Morogoro area.

5.3.6 Snaring
Species susceptible: Probably only affects medium sized carnivores. It is not known to have a major impact.

5.3.7 Retaliatory killing
Species susceptible: Affects all species which attack livestock – genets, mongooses (except dog mongooses and dwarf mongooses), honey badgers (particularly by beekeepers), weasels, zorillas, civets, jackals, cats, otters, palm civets. Bat eared foxes are not affected.

5.3.8 Poisoning
Species susceptible: Affects all species which come to bait (not dog mongoose, bat eared fox, and probably not the cat species)

5.3.9 Illegal trade
Species susceptible: No evidence of an impact at present

5.3.10 Problem animal control
Species susceptible: Probably not a major impact

5.4 Inadequate management

5.4.1 Lack of clear legal framework outside Pas
Species susceptible: All species

5.4.2 Outdated laws
Species susceptible: All species

5.4.3 Inadequate resources (human and financial)
Species susceptible: All species

5.4.4 Lack of education within local communities (negative attitudes to carnivores)
Species susceptible: All species

5.4.5 Lack of involvement of local communities in conservation activities
Species susceptible: All species

5.4.6 Lack of land use plans in community areas
Species susceptible: Species that are habitat specific are particularly affected, specifically the bushy tailed mongoose, Jackson's mongoose, Sokoke dog mongoose, servaline genet and striped weasel.

5.5 Disease

5.5.1 Domestic animals/wildlife interaction
Species susceptible: All canids (rabies, CDV and worms).

5.5.2 Human/wildlife interaction
Species susceptible: No serious disease known

5.5.3 Endemic disease
Species susceptible: All species are potentially affected, particularly social species such as canids and mongooses. All species are also potentially affected by anthrax

5.6 Tourism

No major threat currently known, but there is a need for more information

5.7 Domestic animals

5.7.1 Hybridisation
Species susceptible: Wild cat

5.7.2 Dogs attacking small carnivores
Species susceptible: A major threat to all species

5.8 Interspecific competition

Competition is a natural feature of ecosystems; however human impacted landscapes can affect the natural ecology and cause some species to dominate. When this is combined with habitat loss and fragmentation, there are potentially strong impacts, particularly on small populations. This process will particularly affect species with large home ranges and low density, but there is a need for more information on the exact impacts.

6 Conservation and research priorities

In this last part of the meeting the group used the information above to establish research and conservation priorities. For this they used the information on species distribution and status; the threats facing each species; and the tools available to address these threats to establish overall priorities for all species of small to medium carnivores in Tanzania. The inputs from the management and research authorities from WD, TANAPA, TAWIRI and NCAA were particularly important for this session.

The group identified the following priorities for all carnivore species:

- Design and print an identification poster for all carnivore species in Tanzania and distribute widely (responsible: TCP- TAWIRI)
- Establish a DNA and tissue bank at TAWIRI
- For all small carnivores – representative specimens to be collected and placed in appropriate institutions for training and to collect DNA to establish population structure.
- (responsible: TAWIRI Carnivore centre, Mweka, University of Dar, SUA, Southern Highlands Project (to be handed over to appropriate institution if project ends)

The group identified the following specific national priorities for each species:

6.1 Caracal

The group agreed that there was a strong need to gather more information on this species.
National priorities:

- Establish the distribution across the country
- Establish home range size in representative habitat
- Establish the relative importance of threats outside protected areas in representative habitats
- Review existing trophy quotas

Regional priorities:
Northern region (Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi)

- Establish trends in this region as it is likely to be a stronghold for the species.

6.2 Serval

As with the previous species, there was a strong need to gather more information on this species.
National priorities:

- Establish the distribution across the country
- Establish home range size in representative habitat - outside the crater
- Establish density in representative habitats
- Establish trends in hunted areas
- Establish the impact of retaliatory killing in representative habitats

Regional priorities:
Southern highlands (including Mbeya, Rungwe, Kitulo, Mpanga/Kipengere)
The serval is the largest cat in the Kitulo and Rungwe area.

- Gather information on trends, ecology and anthropogenic killing in the Kitulo/Rungwe area.
- Maintain ongoing efforts in increasing education and prevention of killing in Rungwe and Kitulo (responsible: SHP)
- Reduce access to Rungwe and Kitulo National Park (responsible: FBD and WD)
- Install project manager in Rungwe Forest Reserve (responsible: FBD)
- Change status of Rungwe Forest Reserve to a Nature Reserve (responsible: FBD) and propose to increase status to National park (responsible: TANAPA) both within MNRT

6.3 Wild Cat

As with the previous species, there is a strong need to gather more information on this species.
National priorities:

- Establish the distribution across the country
- Establish the extent of hybridisation around a representative area and comparison with a remote protected area
- Assess the impact of dogs on the species in a representative high dog density area
- Enforce existing laws to keep domestic cats out of protected areas
- Develop and initiate an education program to increase awareness of hybridisation as a conservation issue.
- Ensure surveillance and control of hybrids, prioritising areas around human settlements in protected areas

There were no regional priorities.

6. 4 Spotted Necked otter

National priorities:

- Establish the distribution across the country
- Initiate a study on ways to reduce conflict with fisherman in a high density otter area.
- Initiate a study of the impact of illegal fishing activities, such as poisoning, on otters.
- Initiate an education program to train managers in protected areas and fisheries in otter species identification (responsible: TAWIRI)
- Promote sustainable fishing practices (responsible: TAFIRI and Fisheries Division)

Regional priorities:
North west and central region (Ugalla, Mahale, Minziro, Bukoba, Rubondo, Singida, Dodoma, Tabora, Moyowosi/Kigosi), which is thought to be a stronghold for spotted necked otters.

- Establish trends in Rubondo and Mahale
- Establish abundance and home range size in Rubondo
- Develop techniques to keep otters away from fishing nets (responsible: TAWIRI)
- Promote and maintain pollution surveillance (responsible : NEMC)

Rukwa-Lukwati (includes Katavi, Ruaha, Rungwa, Lwafi)

- Initiate pollution surveillance of lake Rukwa and Nyasa (responsible: NEMC)

6.5 African Clawless Otter

National priorities:

- Establish the distribution across the country.
- Establish as to whether there is conflict with fisherman
- Develop techniques to keep otters away from fishing nets (responsible:TAWIRI)
- Promote and maintain pollution surveillance (responsible: NEMC)

Regional priorities:
Northern region (Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi)

- Establish the presence of the species in the Serengeti through surveys of the Mara river and western Grumeti

Rukwa-Lukwati (includes Katavi, Ruaha, Rungwa, Lwafi)

- Establish population trends in Ruaha National Park.
- Assess the impact of cultural killing on the population around Lwafi GR.
- Initiate education program in Rukwa to reduce medicinal use (responsible: SHCP)

Southern highlands (includes Mbeya, Rungwe, Kitulo, Mpanga/Kipengere)

- Establish population trends in Rungwe and Kitulo
- Assess the impact of cultural killing on the population in Rungwe and Kitulo
- Maintain education program in Rungwe to reduce medicinal use and expand to Kitulo (responsible: SHCP)

Eastern Arc Mountains (includes Usambaras, Uluguru, Udzungwa)

- Establish population trends in the Udzungwa Mountains National Park
- Maintain community conservation program in Udzungwas to reduce medicinal use (responsible: TANAPA)

6.6 Striped weasel

There is very little information on this species, and so conservation activities must pend results from survey work and research.

National priorities:

- Establish the distribution across the country, it is particularly important that sighting points are georeferenced with a high accuracy in order to determine habitat preferences and sites of local abundance.

Regional priorities:

Southern highlands (includes Mbeya, Rungwe, Kitulo, Mpanga/Kipengere)

- Initiate a study to investigate ways to humanely trap in areas where known to occur – Rungwe and Kitulo – in order to facilitate an in depth study of the species.

6.7 Zorilla

There is thought to be no immediate threat to this species and hence there are no national or regional priorities.

6.8 Honey badger

Honey badgers frequently come into conflict with honey gatherers, and hence have an impact on local livelihoods, with potentially negative repercussions on the species. However there is at present very little information about the extent and severity of this conflict and so there is a need for further information. Conservation activities will be dependent on results from research.

National priorities:

- Establish the distribution across the country.
- Compile a list of local methods used to prevent raiding of hives and test their effectiveness.
- Initiate an ecological study of the species in a representative area where beekeeping is also economically important

There are no regional priorities.

6.9 Golden Jackal

National priorities:

- Establish the distribution across the country.
- Establish the importance of disease in population dynamics

- Evaluate the impact of interspecific competition with other jackal species

Regional priorities:

Northern region (Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi)

- Maintain domestic dog vaccination programs around Serengeti together with disease surveillance to test effectiveness of ring vaccination programs on limiting rabies and CDV within protected areas.

6.10 Side-striped jackal

National priorities:

- Establish the distribution across the country.
- Establish the importance of disease in population dynamics
- Evaluate the impact of interspecific competition with other jackal species
- Establish home range size in representative habitat

Regional priorities:

Northern region (Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi)

- Maintain domestic dog vaccination programs around Serengeti together with disease surveillance to test effectiveness of ring vaccination programs on limiting rabies and CDV within protected areas.

6.11 Black backed jackal

National priorities:

- Establish the distribution across the country, particularly the limits to the species range.
- Establish the importance of disease in population dynamics
- Evaluate the impact of interspecific competition with other jackal species
- Establish home range size in representative habitat

Regional priorities:

Northern region (Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi)

- Maintain domestic dog vaccination programs around Serengeti together with disease surveillance to test effectiveness of ring vaccination programs on limiting rabies and CDV within protected areas.

6.12 Bat eared fox

National priorities:

- Establish the distribution across the country, particularly the limits to the species range.
- Establish the importance of disease in population dynamics

Regional priorities:

Northern region (Serengeti, Maswa, NCA, LGCA, Kilimanjaro, Mt Meru, Mkomazi)

- Maintain domestic dog vaccination programs around Serengeti together with disease surveillance to test effectiveness of ring vaccination programs on limiting rabies and CDV within protected areas.

6.13 African civet

National priorities:

There is thought to be no major national threat to this species and hence there are no national priorities. However there are some regional priorities as the species is a frequent component of bushmeat for some cultural groups.

Regional priorities:

Eastern Arc mountains (includes Usambaras, Uluguru, Udzungwas)

- An investigation into the impact of bushmeat hunting on the population in the areas around the Udzungwa Mountains National Park.

6.14 African palm civet

(NB paper recently about distribution of civets across tz – CF to locate)
National priorities:

- Establish the distribution across the country.
- Initiate a study of diet in order to establish the relative importance of different fruits and hence trees. (NB study undertaken in Uganda – CF to locate reference)

Regional priorities:
Coast (includes Mtwara, Zanzibar and Saadani)

- Subspecies on Zanzibar may be particularly vulnerable to hunting by dogs and so an investigation is needed to establish the impact of dog predation on the population.
- Improve law enforcement and forest protection in Zanzibar (responsible: Department of forest fisheries fruits and trade)

Southern highlands (includes Mbeya, Rungwe, Kitulo, Mpanga/Kipengere)

- Improve law enforcement and forest protection in Rungwe Forest Reserves (responsible: FBD)

Eastern Arc mountains (includes Usambaras, Uluguru, Udzungwa)

- Establish the impact of bushmeat hunting on the population around the Udzungwas Mountains.
- Improve law enforcement and forest protection in Udzungwa and Usambara Forest Reserves (responsible: FBD)

6.15 Common genet

The common genet is not immediately threatened in Tanzania.
National priorities:

- Establish the distribution across the country.
- Initiate a study to understand the ecological separation between different species which can then be used to predict distribution.
- Collect representative specimens and place in appropriate institutions for training and collect DNA to establish population structure.

There are no regional priorities.

6.16 Large spotted genet

The large spotted genet is not immediately threatened in Tanzania.
National priorities:

- Establish the distribution across the country.
- Initiate a study to understand the ecological separation between different species which can then be used to predict distribution.
- Collect representative specimens and place in appropriate institutions for training and collect DNA to establish population structure.

There are no regional priorities.

6.17 Servaline genet

The servaline genet is known from only two areas, each with a separate subspecies – Zanzibar's Jozani Forest and the Udzungwa Mountains National Park. Such a limited distribution is a cause of concern and makes this species a high priority.

National priorities:

- Establish the distribution across the country.
- Initiate a study to understand the ecological separation between different species which can then be used to predict distribution.
- Establish the status of the species in the country.
- Collect representative specimens and place in appropriate institutions for training and collect DNA to establish population structure.

Regional priorities:

Coast (includes Mtwara, Zanzibar and Saadani)

- Enforcement of existing laws to protect habitat (responsible: department….)

Eastern Arc Mountains (includes Usambaras, Uluguru, Udzungwa)

- Establish home range size of Lowe's servaline genet in the Udzungwa Mountains National Park and conduct an in depth study to establish the distribution across the park.
- Conservation activities to be initiated pending results from survey.

6.18 Miombo genet

National priorities:

- Establish the distribution across the country.
- Initiate a study to understand the ecological separation between different species which can then be used to predict distribution.
- Establish home range size in a representative area.
- Collect representative specimens and place in appropriate institutions for training and collect DNA to establish population structure.
- Establish the status of the species in the country.

Regional and national conservation activities to be initiated pending results from research.

6.19 Banded mongoose

There is no conservation threat to this species, however there is conflict with people in some areas, particularly with ground nut farmers, and this needs to be addressed.

No national priorities.

Regional priorities:

North West and Central region (Ugalla, Mahale, Minziro, Bukoba, Rubondo, Singida, Dodoma, Tabora, Moyowosi/Kigosi)

- Initiate a study to investigate means of reducing conflict with ground nut farmers in the Mwanza and/or Shinyanga regions.

6.20 Dwarf mongoose

There is no conservation threat to this species.

6.21 Mellers mongoose

National priorities:

- Establish the distribution across the country.
- Establish the status of the species in the country.
- Conservation activities to be developed and initiated pending results from survey work.

6.22 White tailed mongoose

There is no conservation threat to this species, and the species has a potential benefit to people in terms of controlling rodents and reducing crop damage.
National priorities.

- Initiate a study to establish economic value in controlling rodents in agricultural land

No regional priorities

6.23 Egyptian mongoose

There is no conservation threat to this species, and the species has a potential benefit to people in terms of controlling rodents and reducing crop damage.
National priorities:

- Establish the distribution across the country; this should be aided by distributing photographs to PA managers to assist with species identification.
- Establish home range and diet in representative habitat
- Initiate a study to establish economic value in controlling rodents in agricultural land

No regional priorities

6.24 Slender mongoose

There is no conservation threat to this species.
National priorities:
Establish the distribution across the country.

6.25 Marsh mongoose

National priorities:

- Establish the distribution across the country through targeted surveys.
- Conservation activities to be developed and initiated pending results from surveys.

No regional priorities

6.26 Bushy tailed mongoose

Not currently known to be threatened.
National priorities:

- Establish the distribution across the country.
- Establish a comparative index of abundance that can be used to compare between areas.
- Initiate a DNA study to establish population structure and genetic differentiation between different areas

No regional priorities

6.27 Sokoke dog mongoose

The only known population of this species in Tanzania is in the east Usambaras. There is an urgent need for survey work needed to establish its presence in other parts of the eastern arc mountains.
National priorities:

- Establish the distribution and status in the country through targeted surveys.

Regional priorities
Eastern arc mountains (includes Usambaras, Uluguru, Udzungwa)

- Establish a monitoring program for the species
- Protect important habitat by targeting key known localities for species identified by surveys.
- Distribute photographs or posters amongst local community to raise awareness and gather information about the species.

- Further conservation activities to be developed and initiated pending results from surveys.

6.28 Jackson's dog mongoose

The only known population of this species in Tanzania is in the Udzungwa Mountains. There is an urgent need for survey work needed to establish its presence in other localities as well as establishing its status in known areas. In particular, survey work should be targeted at forest areas between 1200-1300m with undisturbed forest.

National priorities:

- Establish the distribution and status in the country through targeted surveys.
- Initiate a DNA study to establish differentiation from Kenyan populations.

Regional priorities

Eastern Arc Mountains (includes Usambaras, Uluguru, Udzungwa)

- Initiate more targeted surveys across eastern arcs to establish presence and population status.
- Initiate a detailed ecological study in the Udzungwas to establish habitat needs, diet preferences and home range.
- Protect key habitat by targeting known localities for the species, as identified from surveys.
- Distribute photographs and/or posters amongst local communities to raise awareness and gather information.
- Further conservation activities to be developed and initiated pending results from surveys.

6.29 Additional species

There are a number of species which have distributional ranges adjacent to Tanzania that may occur in Tanzania, but are as yet undiscovered. The following priorities were established for these species.

6.29.1 Golden cat

- Establish presence in country, by initiating surveys targeted at the following possible areas – Monduli; Nou forest; Congo forest in the North West – Minziro to Mahale; and Lwafi GR (south of Katavi).

6.29.2 Desert dwarf mongoose

- Establish presence in country by initiating surveys targeted at the following possible areas - north east Tanzania near the Kenyan border and coast

5.3 The Way Forward

Managers need information on the status and threats to small and medium carnivores in their areas to plan management activities to enable their conservation, as well as assessing the impact of these activities on their conservation. The proceedings of this workshop synthesise what is currently known about all small carnivore species in Tanzania, and make use of the participants knowledge and experience to establish tools for their conservation, including conservation targeted research and management tools. All participants are deeply proud of Tanzania's international status for conservation, and wish to maintain this reputation. The hard work that participants put into this workshop and report reflects this wish, and will hopefully lead to a more effective monitoring and management programme, hand in hand with training and capacity building.

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