

7.3 Rüppell's fox *Vulpes rueppellii* (Schinz, 1825) Data Deficient (2004)

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Other names

Arabic: tsaaleb (name in use for all foxes), tsaaleb Sahir (Saudi Arabia), taaleb (Maghreb); **English:** Rüppell's fox, sand fox, Rüppell's sand fox; **French:** renard famélique, renard de Rüppell; **Hebrew:** shual holot, shual Negev; **Indigenous names:** Berber: abarhourh (Tachelhaït), akanouch (Zenet), aalboun (Tamazight) (name in use for all foxes); Tuareg: tazbat mallet, achorri, ehadjeh, avarran; Tubu: tourkou fidji tchou ouma (means literally jackal with white tail tip).

Taxonomy

Canis rüppellii Schinz, 1825. In G. Cuvier, *Das Thierreich*, 4: 508. Type locality: "Vatherland Dongola" [Sudan].

Originally included in *Canis*, but subsequently included in the genus *Vulpes*. The specific name has been misspelt in various ways (e.g., *V. rüppelli*: Ellerman and Morrison-Scott 1951). It is most commonly cited as *V. rueppelli* (Coetzee 1977; Corbet and Hill 1980), but the correct spelling of the name is *V. rueppellii*, as used by Wozencraft (1993). The specific name *rueppellii* is the genitive form of "rueppellius", the Latinisation of Rueppell's name (P. Grubb pers. comm.).

Chromosome number: 2n=40 (Ewer 1973).

Description

One of the smaller *Vulpes* species, Rüppell's fox is slighter in build than the red fox (*V. vulpes*), and has smaller limbs (Table 7.3.1). The ears are long and large in relation to the head, rather similar to the fennec fox (*V. zerda*), but this species lacks darker markings on the back of the ears. Coat colour is variable. The head is beige to a pale sand colour. The ears and face are usually pale, with most

animals having black whisker patches running up to the eye, although this too is variable. The colour on the back varies from pale sandy to greyish and even sometimes reddish, with a more or less silvery sheen due to black speckling being present. Flanks and the underbody are usually paler. The legs are beige to a fawn colour, and plantar and digital pads are almost completely covered by hairs. The black speckling from the back culminates in a dense black patch at the base of the tail, which is full and bushy and usually tipped white (a useful diagnostic feature). The fur is very fine and soft with two coats, a thicker darker coat for winter and a lighter colour coat for summer. Females have three pairs of mammae.

Rosevear (1974) remarked that the skull is like a smaller version of the side-striped jackal (*Canis adustus*), but without such well-developed occipital crests. The braincase is rounded, the postorbital processes are blunt and narrow, the zygomatic arches are strong, and the bullae are relatively large (though not so expanded as in fennec fox). The dental formula is 3/3-1/1-4/4-2/3=42.

Rüppell's fox captured from Rhub Al Khali, age and sex not noted. Dubai, United Arab Emirates, 1998.



Chris and Tilde Stuart

Table 7.3.1. Body measurements for the Rüppell's fox.

| | Mahazat as-Sayd Protected Area, Saudi Arabia (Lenain 2000) | Israel (H. Hefner and E. Geffen unpubl.) | Egypt (Osborn and Helmy 1980) |
|-----------|---|---|----------------------------------|
| HB male | 462.3mm (400–520) n=35 | 474mm (430–550) n=9 | 466.0mm (419–519) n=28 |
| HB female | 434.7mm (345–487) n=15 | 450mm (420–480) n=1 | 419.4mm (411–559) n=16 |
| T male | 307.0mm (251–361) n=35 | 295mm (260–330) n=9 | 340.9mm (290–387) n=28 |
| T female | 275.0mm (230–332) n=15 | 268mm (220–300) n=5 | 320.7mm (273–363) n=16 |
| HF male | 111.8mm (100–127) n=35 | | 126.8mm (115–138) n=29 |
| HF female | 104.7mm (96–115) n=15 | | 121.5mm (110–131) n=16 |
| E male | 92.8mm (80–106) n=35 | 98mm (80–110) n=9 | 98.4mm (89–110) n=27 |
| E female | 86.4mm (75–93) n=15 | 90mm (80–100) n=5 | 96.4mm (88–110) n=16 |
| WT male | 1.62kg (1.10–2.30) n=179 | 1.638kg (1000–1800) n=9 | 1.79kg (1.4–2.3) n=13 |
| WT female | 1.48kg (1.10–1.80) n=93 | 1.470kg (1250–1700) n=5 | 1.67kg (1.4–1.8) n=6 |

Subspecies Many subspecies have been described (e.g., Allen 1939; Coetzee 1977), but the variability of specimens seems high (Hüfnagl 1972; Rosevear 1974). The following races seem to be the most valid:

- *V. r. rueppellii* (Egypt and Sudan)
- *V. r. caesia* (north-west Africa and Western Sahara)
- *V. r. cyrenaica* (including *V. r. cufrana*?) (Libya, south-western Egypt, extreme north-western Sudan)
- *V. r. somaliae* (Eritrea and Somalia)
- *V. r. sabaea* (Middle East and Arabic Peninsula)
- *V. r. zarudnyi* (Baluchistan)

Similar species The species may be confused with the red fox (*Vulpes vulpes*), which has darker markings to the back of the ears, especially by European observers who may be unfamiliar with the sleekness, pallor and long ears of local red foxes (Osborne 1992). Their small size may lead to confusion with the fennec fox (*V. zerda*), but the latter has a darker tail tip. The pale fox (*V. pallida*) has a relatively shorter, black-tipped tail, smaller ears, and smaller carnassials (Rosevear 1974).

Current distribution

Widespread in arid biotopes of desert and semi-desert regions of North Africa (north of 17°N) from Morocco and Mauritania to Egypt and Somalia, the northern limit of which is the northern fringes of the Sahara Desert (Figure 7.3.1). Also present in arid regions across the Arabian Peninsula eastwards to Pakistan (68°E) and north-west to Israel and Jordan. Suspected historical expansion of distribution area is likely due to desertification, compensated by competition with the red fox due to new human settlements. It seems to avoid the extreme arid regions in the middle of the Sahara, and the Arabian Empty Quarter, being more abundant on the fringes, in mountain massifs and near oases.

Range countries Afghanistan, Algeria, Chad, Djibouti, Egypt, Eritrea, Ethiopia, Iran, Iraq, Israel, Jordan, Libya,

Mali (?), Mauritania, Morocco (including Western Sahara), Niger, Oman, Pakistan, Palestine (?), Qatar (?), Saudi Arabia, Somalia, Sudan, Syria, Tunisia, United Arab Emirates, Yemen. (Valverde 1957; Ingersoll 1968; Hüfnagl 1972; Rosevear 1974; Osborn and Helmy 1980; Gasperetti *et al.* 1985; Aulagnier and Thévenot 1986; De Smet 1988; Le Berre 1990; Harrison and Bates 1991; Kowalski and Rzebik-Kowalska 1991; Dragesco-Joffé 1993; Cuzin 1996; Lenain 2000).

Relative abundance

Although widespread throughout the Arabian Peninsula, the species is limited by the large desert areas (Harrison and Bates 1991) and is mainly confined to the arid and steppe regions. In southern Morocco, Rüppell’s foxes seem to be rare and the population trend is unknown.

The density of Rüppell’s fox is usually low, but seems higher in areas where food is more freely available, such as near human settlements (Valverde 1957; K. De Smet pers. comm). In a large, fenced, protected area of 2,244km² in Saudi Arabia, densities are 0.68/km² (Lenain 2000). Lower population estimates outside the fenced reserve indicate that the species may be very vulnerable in the over-grazed, human-influenced landscape of central Arabia. In the reserve, the population is stable, but there is a need to document long-term population dynamics (Lenain 2000).

Estimated populations/relative abundance and population trends There is no detailed information on its abundance or status.

Habitat

Their typical habitat includes sand and stone deserts. In Saudi Arabia, they have been found in open and stony habitat often with sparse vegetation cover, including a few herb and grass species (*Fagonia indica*, *Indigofera spinosa*, *Tribulus* spp., *Stipagrostis* spp. and *Panicum turgidum*). Taller vegetation, such as grasses and trees, was usually

Figure 7.3.1. Current distribution of Rüppell’s fox.



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sparse. Annual rainfall averaged 100mm per year with a maximum of 240mm per year (Lenain 2000).

On the northern fringe of the Sahara, Rüppell's fox may be found in areas with up to 150mm annual rainfall. In Morocco (including Western Sahara), the general habitat presents sparse to very sparse vegetation cover, dominated by small brushes (*Hammada scoparia*, *Panicum turgidum*, *Fagonia* spp.) mostly concentrated in wadis (with *Acacia* spp., *Argania spinosa*, *Balanites aegyptiaca*, *Maerua crassifolia* and *Capparis decidua* trees). In Niger (Dragesco-Joffé 1993) and Morocco (F. Cuzin pers. obs.), this species avoids large sand dune areas, where the fennec fox is the only other reported canid species; however, in Algeria, they also occur in large ergs (De Smet 1988).

The Rüppell's fox also lives in coastal areas, with extremely sparse vegetation and without any trees. They are able to survive in areas without any available water, as in central Saudi Arabia (Mahazat as-Sayd protected area) on the fringes of the Arabian Empty Quarter, in Algeria (De Smet 1988) and in Western Sahara, where observations do not show any relationship with distance to the nearest available water (F. Cuzin unpubl.).

Food and foraging behaviour

Food Rüppell's foxes are generalist predators. Their diet includes a high invertebrate content, as well as rodents, lizards, snakes, birds, and wild fruits (Valverde 1957; Osborn and Helmy 1980; Lindsay and Macdonald 1986; Kowalski 1988; Kingdon 1997). Lenain (2000) found that small mammals are an important component of their diet and that in the absence of small mammals, they will turn to beetles (Coleoptera). Scats also contained the remains of desert locusts (*Schistocera gregaria*), which were found in large numbers during some study periods (Olfermann 1996; Lenain 2000), suggesting that they may be very opportunistic.

Foraging behaviour Little is known except that they are solitary foragers (Olfermann 1996) and usually scavenge at camps and permanent human settlements (Valverde 1957; Harrison and Bates 1991; K. De Smet pers. comm; F. Cuzin pers. obs.). The species is mainly crepuscular/nocturnal, but active animals have been seen during the daytime in winter in the Western Sahara (F. Cuzin pers. obs.) and in Tunisia (K. De Smet pers. comm). Lenain (2000) recorded that departure from the den site usually took place in the hour following sunset. This was followed by alternating periods of activity and inactivity throughout the night, the latter usually taking place in the early hours of the morning. Foxes usually re-entered the den site before sunrise, remaining in the den throughout the day.

Damage to livestock or game Local breeders have reported that Rüppell's foxes prey on chickens, lambs and young goats in Saudi Arabia (Lenain 2000), Egypt (Osborn

and Helmy 1980), Niger (Dragesco-Joffé 1993) and in Algeria Hoggar (K. De Smet pers. comm).

Adaptations

Their ability to survive in a hyper-arid environment, where the opportunity to drink would be extremely rare, appears to be facilitated by various ecological, behavioural and physiological adaptations (though not to the extent seen in the fennec fox); even a captive specimen never drank (Petter 1952). The diet, which includes plant material, fruits and roots (Rosevear 1974; Lenain 2000), likely provides much of their moisture requirements, and behavioural (e.g., nocturnal activity patterns) and morphological adaptations (e.g., coat colour, hair on feet, large ears) help in thermoregulation. The role of physiological mechanisms (e.g., urinary concentrating ability) has yet to be established. They are reportedly able to squirt the noxious contents of their anal glands at potential aggressors (Kingdon 1997).

Social behaviour

Little is known, but reports indicate that the species may be gregarious, having been sighted in groups of 3–15 (I. Linn pers. comm.). These may represent extended family groups. Grouping may be incidental, a result of close aggregation of dens in the few areas where denning sites are available.

In Oman, Lindsay and Macdonald (1986) found that home ranges were very expansive covering some 69km², and social units were spatially separate. In Mahazat as-Sayd, Olfermann (1996) found a mean annual home range of 16.3km², while Lenain (2000) gives a figure of 10.2km². Olfermann (1996) found that males had significantly larger seasonal home ranges than females. Adults were usually organised as monogamous pairs.

Reproduction and denning behaviour

In Saudi Arabia, studies show that mating takes place from December to February (Olfermann 1996; Lenain 2000), which usually coincides with the first rains after the harsh summer period. Tracks of two adult animals obviously engaged in a courtship display were found in southern Morocco in November, a few days after heavy rainfall (F. Cuzin pers. obs.). Captures of young cubs have been made in early March in Saudi Arabia (Lenain 2000) and in March in Western Sahara (Valverde 1957). Petter (1952) recorded very young animals in the area of Beni Abbès (Algeria) in May, and peaks of captures of young cubs in Saudi Arabia were made from July to August following the dependency period (Lenain 2000). Gestation lasts 7–8 weeks (Olfermann 1996) and litter size is 2–3 in the Mahazat as-Sayd protected area in Saudi Arabia (Olfermann 1996). Young cubs remain dependent on their parents for an undefined period, after which they venture out from the den site area. Both sexes reach sexual maturity at around 9–10 months (Olfermann 1996).

Dens are commonly located under slabs of rock or dug at the base of trees or bushes (Lindsay and Macdonald 1986; Harrison and Bates 1991; Kingdon 1997). In areas with few shelters (like in southern Western Sahara), the species may use very exposed dens, often in the middle of plains (some of these burrows are dug by honey badgers, *Mellivora capensis*). In such areas, any disturbance induces the flight of the animal (F. Cuzin pers. obs.), and, in Niger, Dragesco-Joffé (1993) states that they often prefer to flee from their den in case of danger. This behaviour is very common for the Arabian red fox too.

In Oman, Lindsay and Macdonald (1986) found that study animals changed den sites frequently, likely as an anti-predator strategy or perhaps due to resource availability in other areas of a home range. Lenain (2000) recorded an instance where a shift occurred due to cooling: a male Rüppell's fox used a shallow scrape in a sabkha-type substrate (packed silt), with a maximum depth of 700mm. This type of substrate offers effective cooling, and midday temperatures may be 12–15°C lower inside the den than outside. This type of shallow scrape was recorded throughout the study area, although its cooling facility varied depending on the substrate.

Competition

In Saudi Arabia, Israel and Morocco, the red fox is present in the fringes of the desert, particularly those colonised by man. Rüppell's foxes may only be able to compete in the harshest desert areas, where the red fox is not able to survive, or in protected areas where red fox control is taking place (Yom-Tov and Mendelsohn 1988). The settlement of new areas represents an opportunity for the red fox to increase its range, at the expense of Rüppell's fox. In the Aïr, Niger, Dragesco-Joffé (1993) suggests that the density of Rüppell's fox is higher in areas where other carnivores, such as golden jackal (*Canis aureus*), caracal (*Caracal caracal*), sand cat (*Felis margarita*), striped hyaena (*Hyaena hyaena*) and fennec fox are absent.

Mortality and pathogens

Natural sources of mortality The fragments of the jaws of a young fox were found in pellets of an owl (*Bubo ascalaphus*) near Idjil (Mauritania) by Heim de Balsac and Heim de Balsac (1954), while Olfermann (1996) recorded predation by steppe eagles (*Aquila nipalensis*) and owls (*Bubo ascalaphus*) in Arabia. Lenain and Ostrowski (1998) recorded the death of a Rüppell's fox in a cage trap as a result of a honey badger attack. However, the honey badger is unlikely to be a predator of Rüppell's foxes and this was probably an opportunistic attack.

Persecution Poisoned baits are used indiscriminately to control predators in Saudi Arabia (Gasperetti *et al.* 1985), Niger (Dragesco-Joffé 1993) and Morocco (Cuzin 1996). Individuals are accidentally killed by jaw-traps used against

jackals (Dragesco-Joffé 1993). They are occasionally killed for food by nomads (Ginsberg and Macdonald 1990; F. Cuzin pers. obs.).

Hunting and trapping for fur Rüppell's fox furs have been found on sale (D. Lenain pers. obs.).

Road kills No road kills were recorded in Morocco (F. Cuzin pers. comm) or in Algeria and Tunisia (K. De Smet pers. comm) or Saudi Arabia (D. Lenain pers. obs.).

Pathogens and parasites Susceptibility to disease is poorly known. However, Lenain (2000) reported seroprevalence to canine distemper virus, canine parvovirus and canine rotavirus. Rabies does affect this species (S. Ostrowski pers. comm.), and they may be infested by ticks (e.g., *Rhipicephalus sanguineus*) and by various species of fleas (Olferman 1996; Lenain 2000).

Longevity Ostrowski (1999) estimated an age of 87.5–88.5 months for a male tagged in 1992 in the wild in Saudi Arabia; the maximum confirmed age in the wild is seven years, but it could be higher (Olfermann 1996). Haltenorth and Diller (1980) give longevity as 6.5 years in captivity.

Historical perspective

None.

Conservation status

Threats Habitat loss, fragmentation and degradation, direct and indirect persecution by hunting, and indiscriminate use of poisons, appear to represent the main threats in Morocco. In Israel, the species is on the verge of extinction due to competitive exclusion by red foxes that are expanding their range following human settlements in the Negev Desert (Yom-Tov and Mendelsohn 1988).

Commercial use Rarely hunted for food or for sale of furs.

Occurrence in protected areas

- *Algeria*: Ahaggar and Tasili n'Ajjer National Parks;
- *Egypt*: Gebel Elba Conservation Area;
- *Israel*: Maktesh Ramon National Park, Tznifim Nature Reserve;
- *Jordan*: Al-Shaumari Wildlife Reserve;
- *Libya*: Nefhusa National Park, Zellaf Nature Reserve;
- *Mauritania*: Banc d'Arguin National Park;
- *Niger*: Aïr and Tenere National Reserve;
- *Oman*: Jiddat al Harasis;
- *Saudi Arabia*: Mahazat as-Sayd, Harrat al' Harrah, Hawat bani Tamim, Uruq Bani Ma'arid, Majami Al Hadb, Saja / Umm ar Rimth;
- *Tunisia*: Sidi Toui National Park.

Protection status CITES – not listed.

The species is classed as Lower Risk: Near Threatened in Morocco (including Western Sahara) (Cuzin 1996).

Current legal protection In Saudi Arabia, there is currently no effective legislation for the protection of native carnivores (P. Seddon pers. comm.). It is not illegal to shoot, poison or trap mammalian carnivores. Hunting laws (Decree No. 457 and Decrees M/22, No.128) restrict such activities within the National Commission for Wildlife and Conservation Development protected areas network. Some of the areas encompass and protect carnivore populations, although none to date have been established with the protection of Rüppell's foxes listed as the main objective.

In Israel, the species is fully protected by law, and no hunting, trapping or trading is allowed. In Morocco, according to the annual hunting decree, Rüppell's foxes and red foxes may be hunted during the whole year, as they are considered as pests. There is no information for other countries.

Conservation measures taken None known.

Occurrence in captivity

Rüppell's foxes are held in captivity. According to the International Zoo Yearbook (1992), only two cases of successful breeding occurred in zoos (Nikolaev, Ukraine and Tel Aviv, Israel). Attempts to breed Rüppell's foxes have not been very successful (Ginsberg and Macdonald 1990), although they have been successfully bred in the Hai Bar Breeding Centre, Eilat, Israel (E. Geffen pers. comm.). According to ISIS data, 2 males, 4 females and 1 unsexed animal are kept in zoos, without any recent reproduction noted. One female is kept in Rabat Zoo, Morocco.

Current or planned research projects

J.B. Williams (Ohio State University, Columbus, USA) and D.M. Lenain and S. Ostrowski (National Wildlife Research Center, Taif, Saudi Arabia) are investigating metabolic response and water turnover of Rüppell's foxes in an arid environment in Saudi Arabia.

S. Ostrowski and D.M. Lenain (National Wildlife Research Centre, Taif, Saudi Arabia) and M. van Vuren (University of Pretoria, South Africa) are undertaking research into seroprevalence of canine diseases in the Rüppell's fox population at Mahazat as-Sayd, Saudi Arabia.

R. Hefner and E. Geffen (Tel Aviv University, Israel) are studying habitat use of Rüppell's foxes in Israel.

Gaps in knowledge

The status and ecology of North African populations remains largely unknown. Monitoring of populations in

well-established protected areas throughout the species' range is encouraged. There is scope for detailed study of competition between Rüppell's and red foxes.

Core literature

Lenain 2000; Lindsay and Macdonald 1986; Kowalski 1988; Olfermann 1996.

Reviewers: Eli Geffen, Stephane Ostrowski, Koenraad J.M. De Smet. **Editors:** Michael Hoffmann, Claudio Sillero-Zubiri.

7.4 Fennec fox

Vulpes zerda (Zimmermann, 1780)

Data Deficient (2004)

C.S. Asa, C. Valdespino and F. Cuzin

Other names

Arabic: Fenek: rhorchi, gorchi, arhorchi, aqorchi (Maghreb); **English:** fennec; **French:** fennec; **German:** fenek, wüstenfuchs; **Spanish:** fenec; **Indigenous names:** Tuareg: akori, akorhal, eresker, ahuneski.

Taxonomy

Canis zerda Zimmermann, 1780. Geogr. Gesch. Mensch. Vierf. Thiere 2: 247. Type locality: "Es bewohnt die Soara und andere Theile von Nordafrika hinter des Atlas, der Ritter Bruce behautet, man Fände es auch in tripolitanischen." [Sahara].

Placed in the genus *Fennecus* by Stains (1975), Coetzee (1977) and Nowak (1999). Wozencraft (1993) included *Fennecus* in the genus *Vulpes*, an arrangement in agreement with many other authorities (e.g., Clutton-Brock *et al.* 1976; Geffen *et al.* 1992e) and followed here. Note that two previously described races, *saarensis* Skjöldebrand, 1777 and *zaarensis* Gray, 1843 are synonyms.

Chromosome number: 2n=64 (Ewer 1973).

Description

The fennec fox is the smallest canid, with extremely large ears that give it the greatest ear to body ratio in the family (Table 7.4.1). The muzzle and legs are slender and delicate. Pelage is typically sandy or cream-coloured, although it may have a light fawn, red or grey cast; underparts are paler. The large ears are darker on the back and white or nearly so inside; ear edges are white. Eyes are large and dark, with dark streaks extending from the inner eye down and outward to either side of the muzzle. Upper parts of limbs reportedly coloured reddish-sand in individuals from North Africa, whereas those from further south are nearly white in these areas. The coat is very thick and long; dense fur on the feet extends to cover the pads. The tail is also well furred with a darker tip and a slightly darker spot