

Field Report

Notes on Blanford's fox in Jabal Masuda, Jordan

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Keywords: ectoparasites, morphometric measurements, threats, *Vulpes cana*.

Abstract

The Blanford's fox *Vulpes cana* has been recorded from several locations in Jordan including Wadi Rum, Dana, Mujib and Jabal Masuda. In this study, we provide new information on Blanford's fox morphology, ectoparasites, activity, and diet in the Jabal Masuda proposed protected area based on the results of live-trapping, camera trapping, spoor surveys and opportunistic sightings. We discuss threats to this species such as habitat destruction and human persecution. Despite the presence of Blanford's fox confirmed from three protected areas in Jordan, conservation measures are required at habitat and species level to ensure the protection of this charismatic species.

Introduction

The Blanford's fox *Vulpes cana* is listed as Least Concern by the IUCN (Mallon and Budd 2011). The species was first described in 1877 from south-western Asia (Roberts 1977; Hassinger 1973; Lay 1967; Bobrinskii et al. 1965; Novikov 1962). Blanford's foxes inhabit warm and mountainous regions of Pakistan, Afghanistan, Uzbek and Turkmen SSR, and south-western Russia (Abu Baker et al. 2004; Amr 2000; Qumsiyeh 1996; Geffen et al. 1993; Harrison and Bates 1989; Mendelssohn et al. 1987; Ilani 1983; Roberts 1977; Lay 1967). In addition, Geffen (1994) reported a questionable record of two individuals observed from a helicopter in the great Rann of Kutch, in India.

In the Middle East, Blanford's foxes have been recorded in Oman, Iran, Saudi Arabia, United Arab Emirates, Sinai, Yemen, and Jordan (Al Jumaily et al. 2013, Cunningham and Wronski 2009, Cunningham and Howarth 2002, Abu Baker et al. 2004; Amr 2000; Qumsiyeh 1996; Geffen et al. 1993; Harrison and Bates 1989; Mendelssohn et al. 1987; Ilani 1983; Roberts 1977; Lay 1967), as well as the Judean desert, near the oasis of En Gedi and at Nahal Ze'elim (Harrison and Bates 1991). Harrison and Bates (1991) described several locations in Machtesh Ramon, southern Sinai, and a dead specimen was found by J. Gasperet

ti on the road, 40km south east of Biljurshi, Saudi Arabia. Further Saudi Arabian records were provided by Cunningham and Wronski (2009). In Oman, records were obtained from Jabal Samhan, Dhofar (Spalton 2002; Harrison and Bates 1989), and in the United Arab Emirates they were reported in the western Hajar Mountains (Cunningham and Howarth 2002, Stuart and Stuart 1995).

The first Blanford's fox record in Jordan was obtained from the Dana Biosphere Reserve, near At Tafilah in the south (Amr et al. 1996). Disi and Hatough-Bouran (1999) observed this species on the rocky slopes of the Petra Mountains. Furthermore, a detailed study was performed by the Royal Society for the Conservation of Nature (RSCN) in nature reserves throughout Jordan, indicating its distribution in the mountainous areas of the Mujib and Dana Biosphere Reserves, and the Wadi Rum Protected Area (Abu Baker et al. 2004). Eid et al. (2013) reported the species in the Jabal Masuda proposed protected area and estimated its population density. Here we add to our knowledge of Blanford's foxes in Jordan by providing information on morphometric measurements, sex ratio, ectoparasites and diet from the Jabal Masuda region.

The following is the established format for referencing this article:

Eid, E., Al Share, T. and Aabed, O. 2015. Notes on Blanford's fox in Jabal Masuda, Jordan. *Canid Biology & Conservation* 18(4): 10-14.
URL: http://www.canids.org/CBC/18/blanfords_fox_in_jordan.pdf

Methods

Study area

The Jabal Masuda proposed protected area is located along the southern highlands of Jordan and covers an area of 295km². The site holds three major habitats namely limestone mountains, scattered sandy areas and sandstone escarpments. The study focused on the sandstone escarpments, which constitute 67km² (22%) of Jabal Masuda and are characterised by rigid sandstone mountains and deep wadis (Figure 1). Blanford's fox has been confirmed in this area.

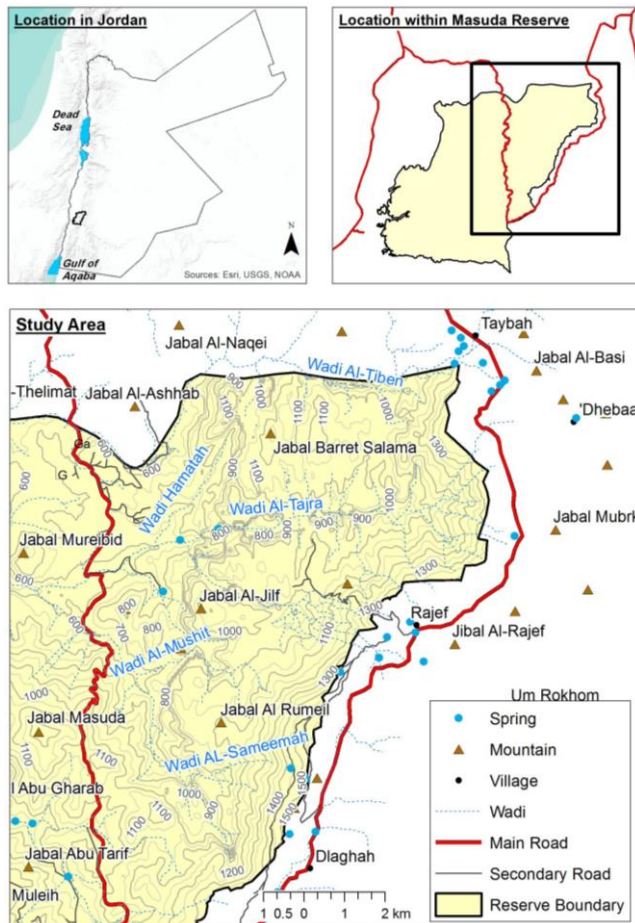


Figure 1. The study area in Jabal Masuda, Jordan.

Live-trapping

A total of 278 trapping nights were performed using 20 medium sized box traps manufactured locally (100 x 40cm). Traps were placed in wadis, open areas and rocky slopes depending mainly on accessibility. All traps were left *in situ* for four successive nights and hidden as much as possible to provide shelter for the captured animals as well as to protect the traps from being taken by local people. Traps were checked every morning and reset late in the afternoon using sardines as bait. When a fox was captured, it was marked by clipping some hair from different parts of the animal's body, identified, sexed and measured with a digital caliper and a measuring tape, after which the fox was released at the same capture site. In addition, droppings at the capture site were examined by teasing them apart by hand to identify food items. We used t-tests to compare males versus females captured and considered relationships significant if $p < 0.05$.

Camera-trapping

A total of 130 camera-trapping nights were performed, using ten camera traps (Stealth Cam 1550, Grand Prairie, Texas, USA). Cameras were

fixed to stones, shrubs or trees at different locations inside the study area, and baited with chicken viscera placed 4-5m in front of the camera. Seven cameras were programmed for still photos, while three were set on video mode. Cameras were placed in the late afternoon and removed in the early morning of the following day. Information was collected on a daily basis and distinguishing features, times and dates were used to identify species recorded.

Spoor identification

A total of eight spoor routes were performed. This method involved selecting a starting point randomly, with researchers walking parallel to each other, depending on the topography of the land. All signs of Blanford's fox presence such as footprints, droppings, dens, dead specimens, skulls or bones were recorded. Records of other carnivores were also gathered. Route lengths varied from 0.47 to 2.01 km.

Opportunistic observations

These include other opportunistic field observations (i.e. sightings, spoor, droppings and skeletal remains) of Blanford's fox that were not conducted during the designed field study, and mapped accordingly.

Results

A total of 27 Blanford's foxes were live captured, including nine recaptures (9M:9F), indicating a sex ratio of 1:1. Table 1 presents morphometric measurements for captured individuals. There were no significant differences in measures of male and female foxes captured, except forearm measurements. Measurements are compared to those from other studies (Table 2).

All captured foxes were examined for ectoparasites, with a single tick species collected (*Rhipicephalus senegalensis* Acarina: Ixodidae). All ticks were located on the ears and cheeks. We found ticks on each fox.

Further investigation on Blanford's fox activity was performed during the survey after analysing photos obtained from camera-trapping. Out of 30 camera trap images obtained, 19 were of Blanford's foxes. Red foxes were recorded on occasion. It was observed that Blanford's fox activity started at 1700hrs (sunset), increased by 2200hrs until 0525hrs and reached a peak at 0400hrs (Figure 2). This is in accordance with Geffen et al. (2003) who stated that the onset of activity was triggered by dim light (sunset).

Eleven Blanford's fox droppings were collected and examined. Phoenician juniper *Juniperus phoenicea* fruits were found in almost 90.9% of the droppings. Goat hair, invertebrates and unidentified bones were also found.

Discussion

Eid et al. 2013 described Jabal Masuda as a new locality in Jordan for the presence of Blanford's fox, effectively extending our knowledge of its distribution. No sexual dimorphism was observed in the captured specimens, but there was a slight variation in colouration, with females having darker ears. In addition, it seems that the population found in the United Arab Emirates is stockier (Stuart and Stuart 1995).

Jabal Masuda is characterised by a diverse and overlapping mixture of landscapes and habitats. The site where Blanford's foxes were recorded was typified by a rigid sandstone mountainous area with steep wadi walls, open areas and wadis. The majority of captures occurred in the rigid and steep wadi walls. Upon release the animals headed directly to the wadi walls, climbing among the rocks until they were out of sight. In contrast, released red foxes ran towards open areas and wadis, and avoided the steep walls. The ability of the Blanford's fox to climb steep slopes is well known (Eid et al. 2013).

The tick *Rhipicephalus senegalensis* was found on all foxes trapped. Walker and Koney (1999) reported *R. senegalensis* in domestic goats.

Table 1: Morphometric measurements of Blanford's fox from Jabal Masuda, Jordan. HB: Head and Body Length; T: Tail Length; FA: Forearm Length; HF: Hindfoot Length; E: Ear Length; HPD: Hindfoot Pad Length; FPD: Forearm Pad Length.

No.	Sex	Weight (kg)	Morphometric Data (mm)						
			HB	T	FA	HF	E	HPD	FPD
1	Male	1.50	420	345	64	90	74	10.7	10.2
2	Male	1.50	454	320	68	103	71	20.7	20.7
3	Male	1.25	463	324	63	95	84	20.9	20.2
4	Female	1.25	463	324	63	95	84	20.9	20.2
5	Female	1.00	388	322	55	90	70	20.4	20.2
6	Male	1.00	418	310	59	89	74	20.6	20.4
7	Male	1.00	435	340	65	104	81	20.9	20.3
8	Male	1.45	460	350	20	101	70	38.8	28.2
9	Female	1.35	428	270	51	90	82	20.0	30.0
10	Male	1.75	413	308	55	93	75	33.4	34.1
11	Female	1.35	411	303	66	88	81	21.6	26.9
12	Female	1.25	396	305	55	97	61	28.0	22.0
13	Female	1.75	436	338	53	87	82	27.9	28.5
14	Female	1.55	440	340	57	94	81	31.3	25.7
15	Female	1.50	424	315	59	83	74	27.2	27.5
16	Female	1.30	449	224	59	91	75	26.0	29.1
17	Male	1.25	384	346	55	84	73	23.6	34.5
18	Male	1.35	431	336	55	92	84	27.3	32.0
Mean	Male	1.34	430.9	331.0	56.0	94.6	76.2	24.1	24.5
	Female	1.37	426.1	304.6	57.6	90.6	76.7	24.8	25.6
Std. deviation	Male	0.24	25.6	15.9	14.3	6.8	5.4	8.2	8.2
	Female	0.21	24.4	36.8	4.8	4.3	7.5	4.1	3.8

Table 2: Comparative morphometric measurements of Blanford's fox from Jabal Masuda, Jordan. HB: Head and Body Length (mm), T: Tail Length (mm), HF: Hind Foot Length (mm), E: Ear Length (mm), and WT: Weight (kg).

Measurement	Jabal Masuda, Jordan (this study)		Geffen et al. 2004, Is- rael		Smith et al. 2003, United Arab Emirates		Cunningham and Howarth 2002, United Arab Emirates		Abu Ba- kar et al. 2004, Jor- dan	Harrison and Bates 1991, Oman, Is- rael, Si- nai
	Male	Female	Male	Female	Male	Female	Male	Female	---	---
Sex	Male	Female	Male	Female	Male	Female	Male	Female	---	---
HB	431	426	427	411	744	711	752	715	383	746
T	331	305	324	317	328	322	332	317	314	337
HF	95	91	92	93	98	93	100	94	91	97
E	76	77	80	78	86	86	85	87	85	82
WT	1.34	1.37	1.00	1.00	1.2	1.3	1.27	1.21	1.00	0.87

Thus their presence on the foxes could be attributed to the relatively high number of livestock present at the site during the survey. Blanford's foxes eat insects from carcasses, and in some cases the hunting of goat kids may have occurred (Stuart et al. 2003). This information adds to our knowledge of the parasite species associated with Blanford's fox, and highlights the need for further research on its interactions with humans and their livestock.

An interesting addition to the Blanford's fox diet in Jordan was the presence of Phoenician juniper fruit. It was the dominant component in faecal remains and was found in large quantities in the survey area, both on trees and on the ground. Juniper forest constitutes 28km² (9.4%) of the total area of Jordan and is under threat from wood cutting, induced fires and habitat degradation. In addition, climatic conditions and drought are leading to a decline of these forests. Fruit ripens in the winter (October to February), and is a major food source for several bird and mammal species. Juniper is considered a medicinal plant (Swanston-Flatt et al. 1990) with sweet tasty fruits, which could explain the foxes' preference for it; they may also have an ecological role in seed dispersal (Herrera 1989). Silva et al. (2005) studied the role of the culpeo *Pseudalopex culpaeus* as a seed disperser, and found that the germination and viability of some seeds of *Porelieria chilensis* was reduced.

In contrast, germination of *Schinus molle* was increased by 50% and no effect on viability was observed. Graae et al. (2004) studied the role of the Arctic fox *Vulpes lagopus* as a seed disperser of Greenlandic plant species and found that the foxes were able to provide long-distance dispersal of seeds otherwise lacking morphological adaptations for dispersal over long distances.

In addition to juniper fruits, Coleopterans, goat hair and unidentified bones were also present in the Jabal Masuda fox diet. Cunningham and Howarth (2002) stated that Blanford's fox diet consisted mainly of invertebrates and fruits in the UAE. Geffen et al. (1992) and Ilany (1983) found that Blanford's foxes were primarily insectivorous and frugivorous, whereas Roberts (1977) found them to be largely frugivorous in Pakistan.

Roberts (1997) stated that the tip of the tail is generally black, but may be white in some specimens. This variation was noticed in this study, where two specimens (11% of those captured) had a white tail tip (Figure 3), but was not mentioned by Abu Baker et al. (2004) in the extensive surveys carried out in Jordan. Smith et al. (2001) considered the white-tipped tail a genetic variation among the UAE population and not

an abnormality as reported by Stuart and Stuart (1995). This was verified by two pups at the Breeding Centre for Endangered Arabian Wildlife (Sharjah), one with a black tip and the other with a white tip to their tails, with the white tip evidently inherited from the father who also had a white-tipped tail. In the UAE approximately 20% of Blanford's foxes trapped, photographed or killed on roads showed white-tipped tails (Llewellyn-Smith 2000; Cunningham and Howarth. 2002).

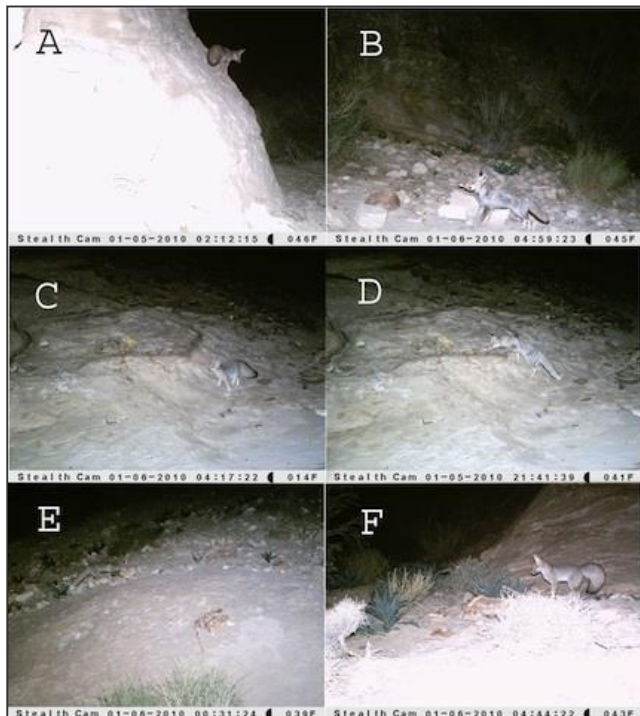


Figure 2. Example camera trap photos of Blanford's fox recorded in Jabal Masuda, Jordan.



Figure 3. Blanford's fox with white-tipped tail captured during the survey in Jabal Masuda, Jordan.

In addition to habitat destruction, human persecution is a major threat to Blanford's foxes in Jordan (Baker et al. 2004). We consider the small area of suitable habitat (i.e. the sandstone mountains in south western regions of Jordan) that renders the species vulnerable among fox species in Jordan. Interviews showed that local people do not differentiate between foxes in Jordan (Abu Baker et al. 2004), and the reported use of fox meat as a medicine, and body parts, especially tails, by Beduins was confirmed by a red fox tail observed hanging inside a car in Ma'an city.

Acknowledgements

Our appreciation is extended to the Embassy of the Netherlands in Amman, Jordan, for their extremely generous support with this project. Our thanks also go to the Royal Society for the Conservation of Nature for their work in protecting habitats and species in Jordan. The support provided by Mr Malik Al Owaji, Mr Yasine Ananbeh and Mr Akram Ma'akbeh is also greatly appreciated. Our gratitude goes to Mr Ahmad Al Za'areer for his valuable assistance in reading this manuscript. Thanks are extended to Natalia Boulad for map preparations. We are also grateful to Zuhair Amr for his enormous contributions to enriching our knowledge and understanding of the fauna of Jordan.

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