

The Carnivores of the Northeastern Badia, Jordan

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Abstract: The presence of 8 carnivores representing 3 families (Canidae, Felidae and Hyaenidae) in the northeastern Badia was confirmed by trapping and spotlighting. The family Canidae is represented by 4 species: *Canis aureus syriaca*, *Canis lupus arabs*, *Vulpes vulpes* and *Vulpes rueppelli*. Three felines, *Caracal caracal schmitzi*, *Felis margarita* and *Felis sylvestris tristrami*, were spotlighted. Remains of recently killed *Hyaena hyaena syriaca* were recovered.

Major threats affecting the population of desert carnivores such as poisoning and shooting are discussed in detail. Current local, IUCN and CITES statuses of the carnivores of the Badia area are given.

Key Words: Jordan, Carnivores, Conservation.

Ürdün'de Kuzeydoğu Badia'nın Etoburları

Özet: BÜÇ familyayı (Canidae, Felidae, Hyaenidae) temsil eden 8 etoburun kuzeydoğu Badia'da varlığı kapan ile projektör yöntemiyle doğrulanmıştır. Canidae familyasını temsil eden türler *Canis aureas syriaca*, *Canis lupus arabs*, *Vulpes vulpes* ile *Vulpes rueppelli*dir. Kedigillerden 3 tür (*Caracal caracal schmitzi*, *Felis margarita*, *Felis sylvestris tristrami*) projektör yöntemiyle gözlenmiştir. Yeni öldürülmüş olan *Hyaena hyaena syriaca* leşleri toplanmıştır.

Çöl etoburlarının nüfusunu etkileyen zehirlenme ve silahla vurulma gibi tehditler ayrıntılarıyla ele alınmıştır. Ayrıca Badia bölgesindeki etoburların şimdiki yerel, UICN ve CITES durumları verilmektedir.

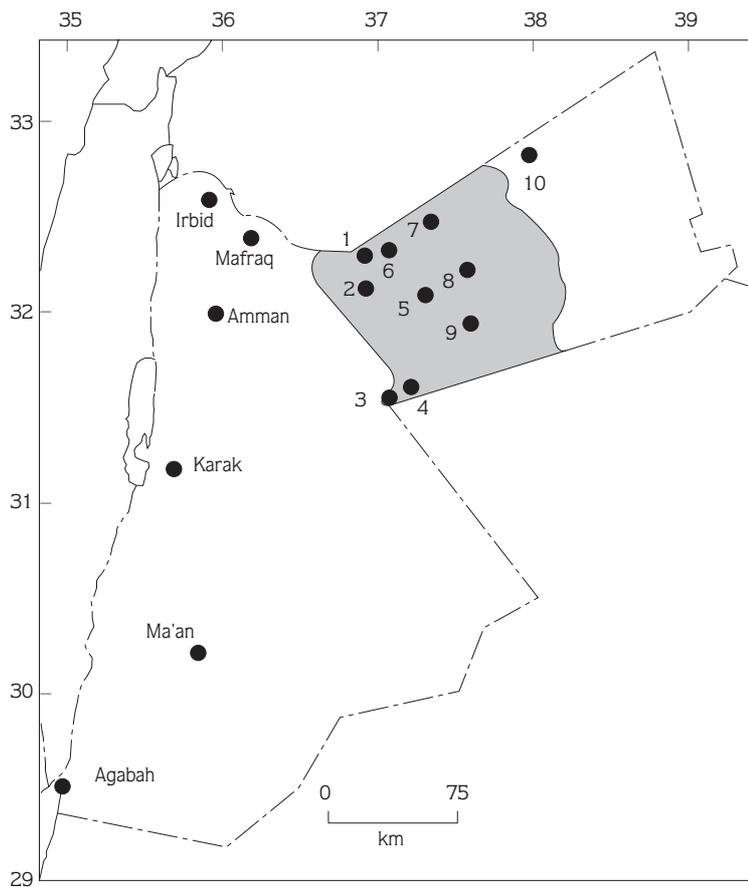
Anahtar Sözcükler: Ürdün, etobur, koruma.

Introduction

The carnivores of Jordan are represented by 5 families (Canidae, Felidae, Hyaenidae, Herpestidae and Mustelidae), with a total of 18 surviving species (1). Earlier treatments (1, 2, 3, 4, 5, 6, 7) reported on the wild carnivores in Jordan; however, virtually no reference is available on the northeastern Badia except that of Bunaian et al. (8). The carnivores of the northeastern Badia remain largely unknown, Perhaps the remoteness of the area and problems with field logistics are among

the main obstacles to obtaining information on this interesting group of mammals. Most of the information available on the mammals of the Azraq area was reported by Atallah (9). Harrison and Bates (10) gave the most comprehensive treatment of the mammals of the Arabian Peninsula and Jordan, with records of carnivores reported earlier.

Over the past few years, northeastern Jordan has witnessed environmental changes, including habitat modification due to agricultural development in the form



- List of localities
1. Deir A-Kahf
 2. A-Areteen
 3. Al-Dahek
 4. Sabkhat Al-Hazim
 5. Al-Buqa'wiyah
 6. Jawa
 7. Al-Hashad
 8. Wadi Salma
 9. Al-Qattafi
 10. Qasr Burqu

of water abstraction, population increase and herd grazing, which eventually affected the carnivores of this area. Indeed, all the animals inhabiting arid regions have been drastically affected by these problems.

The present study focuses on the diversity and habitat preference of the carnivores of the Badia area, as well as addressing the major threats affecting them.

Study Area

The study area was about 11,210 km², almost 18% of the total area of Jordan. Different sites with distinct ecological habitats were selected (Figure 1). Brief descriptions of the study sites follow.

Sabkhat Al-Hazim (31° 35' N 37° 15' E): This site is characterized by the presence of sand dunes dominated by *Nitraria retusa*. Other vegetation includes palm trees (*Phoenix dactylifera*), *Atriplex* and *Tamarix* sp. Currently, Al-Hazim is undergoing agricultural development. Farms for cultivating watermelons, squash and some other products are becoming quite common. On the outskirts,

a Badia police station was built in the early 1980s for patrolling the Jordanian-Saudi borders.

Buqa'wiyah (32° 03' N 37° 07' E): This is a rather open flat area with seasonal water trapped in a depression that may last for several months. Ground vegetation includes *Artemisia* sp., *Origanum* sp. and *Achillea fragrantissima*.

Al-Qattafi (31° 55' N 37° 29' E): Located on the way from Buqa'wiyah to Al-Hazim, this area is rich in extended wadi systems with relatively thick vegetation. To the east, a series of basalt mountains surrounds the terrain. A water pumping station that serves the entire community for several hundred kilometers is located in a flat depression. Tank trucks constantly cross the area for water. Also, sheep and camel grazing is very heavy. Large sheep herds were seen on different occasions.

Swaiiad (32° 18' N 37° 27' E): This site is a cultivated marabb. Barley is the most abundantly cultivated crop. The marabb is also used for grazing.

Qasr Burqu (32° 37' N 37° 58' E): This area is about 70 km to the east of Safawi. The Qasr is located on the edge of an annual rain-fed pool about 1 km long and 200-300 m wide. A black lava desert extends to the southeast and southwest. Different vegetation types cover the area, such as *Anabsis articulata*, *Scrophularia deserti*, *Artemisia monosperma*, *Achillea fragrantissima*, *Astragalus spinosa*, *Ferula* sp., *Ochradenus baccutus*, *Peganum harmala* and other ephemerals.

Al-Dahek (31° 33' N 37° 88' E): A depression area close to Al-Hazim. The periphery is marked with a series of mountains. Caves of various sizes are quite common along the clefts. Most of the depression is devoid of vegetation.

Al-Hashad and Wadi Salma: (32° 33' N 37° 38' E): A shallow exposed wadi with smaller, fewer rocks and more areas of exposed soil. It has very poor vegetation cover. The main vegetation includes *Layeroides* sp., *Helianthemum lipii* and *Zilla spinosa*.

The salma area consists of 5 main regions: Wadi Salma, Upper Wadi Salma, Lower Wadi Salma, Marab Wadi Salma and Qaia Salma. It is flat, with small, medium and large Wadis carved into the plain. The vegetation cover is light, dominated by *Notobasis* sp., *Culpineae lineari*, *Atractylis cancellata* and *Artemisia herba-alba*.

Deir Al-Kahf and Jawa and Al-Areteen

Deir Al-Kahf (32° 17' N 36°50' E): A small village located to the north-east of the study area. The surroundings are covered by small to medium-sized basalt stones. The altitude of this area may reach 1000 m above sea level at certain parts. Most of the area is devoid of vegetation; however, small shrubs are found along wadi beds.

Jawa (32° 20' N 37° 02' E): A large depression that extends to Wadi Rajil. Caves are quite common, however, the vegetation cover is poor.

Al-Areteen (32° 07' N 36° 53' E): A relatively high mountain that consists of basalt rocks. Shallow caves, inhabited mostly by birds are common.

Materials and Methods

The methods used in this study have been described earlier (6, 10). Briefly they are as follows (Table 1). This study was conducted from the 1st of September to

Table 1. Methods and techniques used in the study

Site	Night trapping	Spotlighting	Sweeping
Sabkhat Al-Hazim	72	20	11
Buqa'wiyah	32	8	5
Al- Qattafi	50	4	6
Swaia'ad	50	17	5
Qasr Burqu	36	25	6
Al-Dahek	32	8	6
Al-Hashad & Wadi Salma	28	10	5
Deir Al-Kahf, Jawa & Al-Areteen	14	6	4
Total	314	98	48

the end of November (the survey was halted for 2 weeks after the death of F. Bunaian).

Surveying for animal signs and sweeping

Surveying for animal signs was designed to provide information on the presence and distribution of species. Footprints, scat, runs, dens, scent marking places or any other evidence of carnivore activity or presence, such as remains, were noted. Forty-eight hours of sweeping was conducted at the various sites.

Cage trapping

Opportunistic trapping to establish and confirm the presence of species in order to assess populations of more abundant species was undertaken, using 12 (100 cm x 30 cm x 30 cm) traps. A total of 314 night trappings were conducted. Canned sardine was used as bait.

Night time spotlight transects

Nighttime spotlight transects were conducted using vehicles on roads in the reserve and on its fringes and utilizing 1 or 2 spotlights with 800,000 candle power. Ninety-eight hours of spotlighting were performed as shown in Table 1.

Night time observation

Nighttime observation sessions were conducted at certain locations, sometimes using vehicles as hides and utilizing spotlights when animals were spotted. This was most successful when the baiting station was observed.

Results

Live trapping

A total of 314 night traps at the different study sites yielded 34 animals (Table 2). The trapping success ranged from as high as 24% at Al-Qatafi to as low as 0% at Jawa and the Deir Al-Kahf area. The red fox, *Vulpes vulpes*, was the most common species (25 animals), followed by the sand fox, *Vulpes rueppilli* (4 individuals). Feral dogs were caught at several occasions from Al-Hazim, Buqa'iyah, Swaia'ad and Al-Dahek (5 dogs).

The Ethiopian hedgehog, *Paraechinus aethiopicus*, was also found in the traps, especially at Al-Hazim. It is noteworthy that in one trap, an unharmed hedgehog was found along with a sand fox.

Spotlighting:

A total of 98 hours of night spotlighting was conducted (Table 3). This technique proved to be efficient since several carnivores were spotted. Animals were positively identified to the species level as much as possible. Thirty-three red foxes, 1 sand fox, 2 wolves, 1 jackal, 2 sand cats, 4 wild cats and 1 caracal were

identified from the study sites. Three foxes and 2 *Canis* sp. were also observed.

The red fox was by far the most observed carnivore at all sites (except Al-Hazim), followed by the wild cat, *Felis silvestris*, at 3 sites. The wolf was spotlighted only in Al-Hazim, while the Arabian jackal, *Canis lupus*, was seen in Swaia'ad. The caracal, *Caracal caracal*, was spotlighted at Al-Dahek (by the late F. Bunaian).

Unexpectedly, the sand cat, *Felis margarita*, was found in the Qasr Burqu area, 5km NW of Mansheyat Al-Ghiath, in the Eastern Desert (N 32° 31' 19.3" E38° 04' 9.8") and from 14 km E Erwished (N 33° 30' 15.9" E38° 15' 4.3").

Species spotlighted and/or trapped:

Family Canidae

***Canis aureus syriaca* (Matschie, 1900) Syrian jackal**

The Syrian jackal was spotlighted in the Al-Hazim area. In another study in the Azraq area, this species was seen a few hours before dusk. The Syrian jackal prefers open areas with scattered trees and bushes, grass and

Animal	1	2	3	4	5	6	7	8	Total
<i>V.vulpes</i>	5	0	12	5	1	1	1	0	25
<i>V. rueppilli</i>	2	0	0	2	0	0	0	0	4
<i>C. lupus</i>	0	0	0	0	0	0	0	0	0
<i>C. aurus</i>	0	0	0	0	0	0	0	0	0
<i>Dog</i>	2	1	0	1	0	1	0	0	5
<i>F. margarita</i>	0	0	0	0	0	0	0	0	0
<i>F. silivstris</i>	0	0	0	0	0	0	0	0	0
Total	9	1	12	8	1	2	1	0	34

Table 2. Results of trapping in the study sites

1. Sabkhat Al-Hazim, 2. Buqa'wiyah, 3. Al-Qattafi, 4. Swaia'ad, 5. Qasr Burqu, 6. Al-Dahek, 7 Al-Hashad & Wadi Salma, 8. Deir Al-Kahf, Jawa and Al- Aritein.

Animal	1	2	3	4	5	6	7	8
<i>V.vulpes</i>	0	2	1	4	8	1	9	8
<i>V. rueppilli</i>	0	0	0	0	0	1	0	0
<i>C. lupus</i>	0	0	0	2	0	0	0	0
<i>C. aurus</i>	1	0	0	0	0	0	0	0
<i>Dog</i>	2	1	0	1	0	1	0	0
<i>F. margarita</i>	0	0	0	0	5	0	0	0
<i>F. silivstris</i>	0	1	0	2	1	0	0	0
<i>Vulpes</i> sp.	0	1	0	0	0	2	0	0
<i>Canis</i> sp.	0	0	1	0	0	0	1	0

Table 3. Results of Spotlighting in the study sites

1. Sabkhat Al-Hazim, 2. Buqa'wiyah, 3. Al-Qattafi, 4. Swaia'ad, 5. Qasr Burqu, 6. Al-Dahek, 7 Al-Hashad & Wadi Salma, 8. Deir Al-Kahf, Jawa and Al- Ariteen

copse. It is somewhat smaller than the wolf; its tail and snout are short.

Canis lupus arabs (Pocock, 1934) Arabian Wolf

Two individuals were spotlighted at Swaia'ad. It was not observed in other parts of the study area.

Vulpes rueppelli sabaia (Pocock, 1934) Rüppell's Sand Fox

The sand fox was trapped from 2 study sites; Al-Hazim (twice) and Qaser Burqu (1 animal). However, it was not observed during our night spotlighting at either site. This fox was also spotlighted at Al-Dahek although we failed to trap it at this site. It is noteworthy that Al-Hazim and Al-Dahek are in close proximity to each other (less than 5 km).

Another killed sand fox was found near the cultivated fields in Al-Hazim, where it was found severely butchered.

Family Felidae

Caracal caracal schmitzi (Matschie, 1912) The Caracal

The late Fayez Bunian at Al-Dahek observed the caracal. The occurrence of the caracal at this site was no surprise for us, since it was previously recorded from the nearby Shaumari wildlife reserve (4).

Felis margarita Loche, 1858 The Sand Cat

During our night survey and spotlighting (28.9.1997) in the Burqu'a area, 5km NW Mansheyat Al-Ghiath, in the Eastern Desert (N 32° 31' 19.3" E38° 04' 9.8"), a sand cat was observed at around 11:56 pm in an area dominated by small shrubs, and from 14 km E Erwished (N 33° 30' 15.9" E38° 15' 4.3").

The cat was examined and its identification was confirmed by the presence of a mat of long hair on the soles of the feet concealing the pads, and pronounced black elbow bars externally. The animal was subsequently released. Despite intensive trapping and spotlighting, the cat was neither observed nor trapped in Wadi Araba (RSCN unpublished report).

Felis sylvestris tristrami (Pocock, 1944) The Wild Cat

The wild cat was seen in 3 sites: Buqa'iwiyah (1 individual), Swaia'ad (2 animals) and Qasr Burqa.

Family Hyanidae

Hyaena hyaena syriaca (Matschie, 1910) The Syrian Hyaena

No actual hyenas were observed during this study; however, the remains of freshly killed animals were documented.

Discussion

Generally, all carnivores with the exception of the widely distributed red fox, *V. vulpes*, are considered locally endangered (Table 4). This conclusion is based on the accelerating rate of decline in their populations. In this study, the presence of 8 carnivores in the Eastern Badia was confirmed using trapping and spotlighting.

Evidently, the red fox was the most abundant carnivore (25 trapped and 35 spotlighted). Its presence was confirmed at all the study sites. Indeed, this is a very adaptable species found in all types of habitats in Jordan. In the Dana Wildlife Reserve (DWR), it was the most commonly captured carnivore (6). Also, in a study in northern Saudi Arabia, similar results were reported for Harrat al-Harrah (12).

The sand fox, *V. rueppelli*, was found to inhabit 3 sites (Al-Hazim, Al-Dahik and Swaia'ad). The first 2 sites are in close proximity to each other, whereas Al-Hazim is dominated by sand dunes.

To some extent, Swaia'ad is a flat area that stretches into sand dunes to the east. It seems that the sand fox avoids basalt deserts that extend in the northern parts of the Badia. The sand and the red foxes coexist in Al-Hazim and Swaia'ad.

None of the large wild canids was trapped, despite the fact that feral dogs were found in the traps. The Asiatic jackal and the wolf were spotlighted at Al-Hazim and Swaia'ad respectively. Neither species was trapped at DWR (6); however, their presence was confirmed by spotlighting and cranial remains. Perhaps the trap size, bait used or other behavioral aspects are among the reasons that prevented its trapping.

Species	IUCN Mace/Lande	CITES	Local status
<i>Canis aureus syriaca</i>	Requiring no immediate conservation action	Not listed	Endangered
<i>Canis lupus arabs</i>	Vulnerable\Rare	Appendix I and II	Endangered
<i>Vulpes rueppelli sabaea</i>	Not listed.	Not listed.	Endangered
<i>Hyaena hyaena syriaca</i>	Endangered	Not listed.	Endangered
<i>Felis sylvestris tristrami</i>	Endangered (all Middle Eastern spp).	Appendix II	Endangered
<i>Felis margarita harrisoni</i>	Endangered	Appendix II	Endangered
<i>Caracal caracal schmitzi</i>	Critical	Appendix I	Endangered

Table 4. IUCN, CITES and local status for the carnivores of the Badia area

The wild cat is not very common. It was spotlighted in 3 locations. A similar observation was reported from Harrat al-Harra by Seddon et al. (12), where they observed only 1 cat during their study. However, this species was seen and trapped on several occasions at DWR (6).

The caracal was spotlighted at Al-Dahik. This cat was recorded earlier from the Shaumari Wildlife Reserve (4). It was trapped at DWR near the campsite (6). As for the surrounding regions, it was trapped from Harrat al-Harra (12). The caracal is undergoing a severe decline in its population throughout the country.

The sand cat has been recorded from southern Jordan, Saudi Arabia, South Yemen, Kuwait, Qatar and Oman (10, 13, 14). It is currently considered rare, probably due to its largely nocturnal lifestyle and secretive habits; however, it may well be more widespread than records suggest. It is extremely sensitive to human disturbance, habitat encroachment and competition from larger predators. Other threats include poisoning and baiting.

Although Abbadi (15) gave an extensive account on the behavior, dispersal and biology of the sand cat in Wadi Araba, our survey failed to find the cat on the Jordanian side of Wadi Araba.

Sandy desert and depressions without Acacia are its preferred habitats. Principal prey species are small desert rodents and, to a lesser extent, birds, reptiles and insects. Water requirements are sustained through absorption of moisture from prey kills. Individual M/F territories overlap and cover at most 16km² It is largely sedentary

moving occasionally over larger distances, 8-10 km (15). The IUCN status for this cat is endangered and under appendix II in the CITES.

In the Middle East, several animals are persecuted by the locals for wrongful superstitions and beliefs. This persecution varies from killing the animal in question to keeping away from its living populations. The IUCN statuses of the carnivores in the study area are given in Table 4.

Wolves, Asiatic jackals and hyenas are the most affected carnivores. They are killed instantly when encountered in many parts of the country. Many locals believe very strongly that hyenas can cause humans to hallucinate, directing a victim to its den and finally eating him alive. These beliefs have caused a substantial decrease in the hyena's populations. During our survey, we encountered 3 freshly killed hyenas (1 adult and 2 young individuals) in the Al-Hashad area. Poisoned bait was placed in the proximity of Al Hashad, where hyenas were targeted. Also, in Deir Al-Kahf village, 3 cubs and their mother were mutilated in a cave overlooking the village.

No accurate distinction between the sand and red foxes is reported among the locals. The practice of carcass poisoning for the mass killing of wild carnivores is very prevalent. In the spring of 1997, over a dozen red foxes were found dead not far from a poisoned carcass in Al-Hashad. The survey team in Al-Hashad and Wadi Salma made a similar observation, where the Badia police station called for the Ministry of Agriculture to poison the "large herds of foxes". Again, a butchered sand fox, recovered from Al Hazim farm, is another example of

such practices. Table 5 summarizes instances of animals found killed.

Table 5. Carnivores killed by man in the Badia area

Location	Date	Animal	No. of Animals	Means of Killing
Wadi Al-An'nezha	August 1997	hyena	3	Poisoning
Al-Hashad	August 1997	fox	12	Poisoning
Deir Al-Kahef	1997	hyena	3	Shooting
Al-Ruwayshid	October 1997	wolf	5	Shooting

The expansion of agriculture in the heart of the Jordanian desert has led to a plight for the native carnivores. Human settlements and the use of chemicals have reduced the natural preys in the surrounding habitats. Also, many shy animals such as the felines have virtually disappeared from many habitats.

There is an urgent need to protect the remaining scattered populations of the sand fox (*Vulpes rueppelli*) and the sand cat (*Felis margarita*). Both species will be on the verge of local extinction if the current practices continue. Additionally, the implementation and enforcing the Wildlife Protection Law through different authorities in the eastern Badia is imperative.

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Increasing public awareness through education of the locals as well as the Badia police staff on the national importance of the wild animals in the eastern Desert will eventually help to preserve the remaining carnivores. Further long-term studies to assess the population size and identify major threats posed to the carnivores of the Badia area are needed.

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