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## Fauna of Wadi Al-Quff Protected Area: Amphibians, Reptiles and Mammals

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Mazin Qumsiyeh

Palestine Museum of Natural History and Palestine Institute of Biodiversity and Sustainability, Bethlehem University

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### ABSTRACT

A survey on the vertebrates of Wadi Al-Quff Protected Area (WAQPA) was conducted as part of a management plan preparation. Nineteen mammal species were recorded and all but one (Marbled Polecat, *Vormela peregusna* listed as vulnerable species) are of “least concern” by the IUCN. The pipistelle bat *Pipistrellus pipistrellus* was a notable finding as its most southern range of distribution so far in Palestine. Three amphibians were recorded. Among 21 reptile species recorded, three species of geckos were noted including Kotschy's Gecko, *Mediodactylus (Cyrtoactylus) kotschyi*, representing the southern-most record for this species. Other reptiles recorded include the starred agama *Stellagama stellio* (most common reptile in WAQPA), seven species of lizards, and seven species of snakes. The Spur-thighed Tortoise (*Tesudo graeca*) and Gunther's Skink (*Chalcides guntheri*) are considered vulnerable species according to the IUCN Red List.

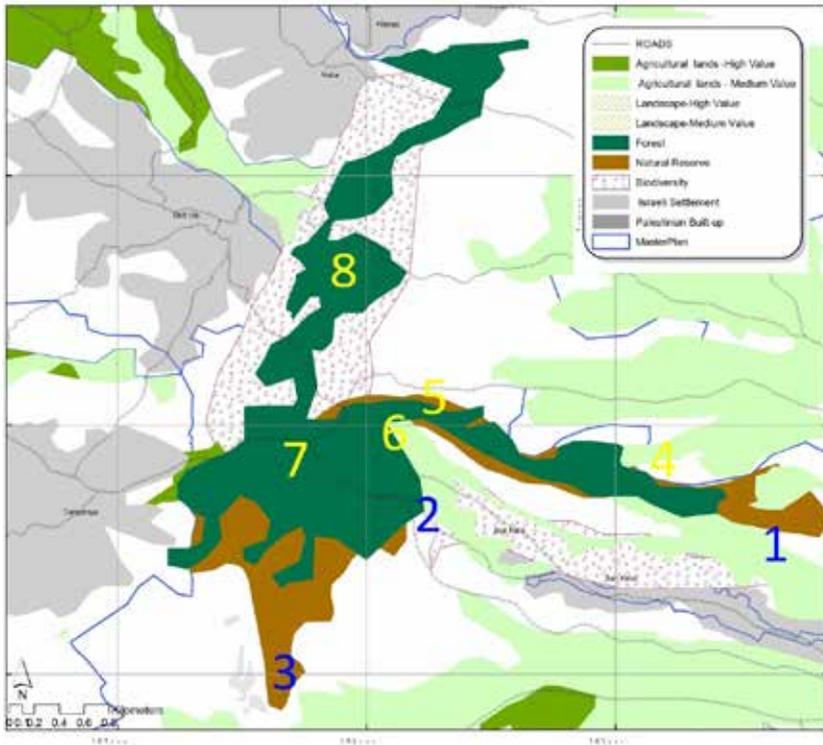
**Keywords:** Vertebrates; Palestine; Mammals; Pipistrellus; Mediodactylus.

### INTRODUCTION

Faunal studies in the occupied Palestinian Territories have not been studied for many reasons including the Israeli occupation since 1967. For example, the last detailed study on the mammals of the area was conducted over 20 years ago (Qumsiyeh, 1996). Recently, the Palestine Museum of Natural History began accumulating data on the fauna of the West bank including vertebrates (Salman *et al.*, 2014; Handal *et al.*, 2016). The Wadi Al-Quff area is the first Palestinian administered Nature Reserve. With help from the IUCN and the Environmental Quality Authority, a study was initiated to draft a management plan for this reserve. As a first step in such management plans, a baseline survey of fauna and flora was carried out, and here we report on the vertebrate fauna, excluding birds, of Wadi Al-Quff Protected Area (WAQPA).

### MATERIALS AND METHODS

Wadi Al-Quff area is located to the north of Hebron, with a Mediterranean maquis forest patched with planted pine forest. The study area is described in detail and a management plan was created for it by the Palestinian Environmental Quality Authority (EQA, 2014). Figure (1) illustrates key areas that were intensively studied based on habitat type.



**Figure 1.** Habitat types of the WAQ area. Numbers in blue (1, 2 and 3) indicate water sources of significance for vertebrate biodiversity and numbers in yellow indicate habitats that we noted with significant for other conservation value discussed in detail (Figure adjusted from a baseline map by Applied Research Institute of Jerusalem).

Amphibians were observed at night using a flash light. Tadpoles were taken directly from the water using a small net. Reptiles were observed during daylight and at night and were photographed. Occasionally some individual specimens of reptiles were captured for more accurate laboratory identification. Signs of mammals (footprints, feces, burrows and quills), were checked during daytime. Potential hideouts (e.g. caves and crevices) were also inspected, Sherman traps were used to trap small mammals (rodents and shrews), while mist-nets were set for bats. Traps were collected before sunrise, and then a subsequent area sweep was performed for morning animals. Bats were observed by checking for roosting sites. BatBox III detector was used to detect bat activity between sunset/dusk and midnight in three locations (Areas 3, 2, 1) and two times in the early morning hours in two locations (Areas 6 and 7). A simple recorder was used to record these calls. A camera trap was installed on a spring near Telem colony.

Species were identified using standard keys (Qumsiyeh, 1996; Disi *et al.*, 2001; Bar and Haimovitch, 2012). For many specimens, identification was done at Palestine Museum of Natural History (PMNH) including our nascent Palestine Biodiversity Research Center (PBRC) and the Bethlehem University laboratories for genetic studies. Some voucher specimens were kept or photographs and stored at PMNH and PBRC).

## RESULTS AND DISCUSSION

### AMPHIBIANS

One specimen of the common green toad, *Pseudepidalea variabilis*, was obtained from a cave inhabited by the Egyptian Fruit Bat. Not quite in the reserve area but in the area of Hasqa near the water spring, *Pelophylax bedriagae* and *Hyla savignyi* were observed. *Hyla savignyi* was far more common with the chorus of males in May making extremely loud noises from dozens of individuals.

Amphibians are good indicators of environmental quality and deterioration. Tree frogs were rather common in the areas of Solomons' pools and Artas about 15 km north of WAQ but have declined. They still occur in Husan and Battir areas though may be also in decline (Salman *et al.*, 2014).

### REPTILES

A total of 21 species of reptiles representing ten families were recorded in WAQ (Table 1, Figs. 2-3). Two are listed as vulnerable (*Chalcides guentheri* and *Testuo graeca*) according to the IUCN Red List.

**Table 1.** Reptiles recorded from WAQ.

Family	Species	Common Name	IUCN status
Testudinidae	<i>Tesudo graeca</i>	Spur-thighed Tortoise	VU
Gekkonidae	<i>Hemidactylus turcicus</i>	Turkish Gecko	LC
	<i>Mediodactylus kotschy</i>	Kotschy's Gecko	LC
Phyllodactylidae	<i>Ptyodactylus guttatus</i>	Spotted Fan-toed Gecko	LC
Agamidae	<i>Stellagama stellio</i>	Starred Agama	LC
Chamaeleonidae	<i>Chamaeleo chameleon</i>	Common chameleon	LC
Lacertidae	<i>Acanthodactylus sp.</i>		
	<i>Phoenicolacerta laevis</i>	Lebanon Lizard	LC
	<i>Ophisops elegans</i>	Snake-eyed lizard	LC
Scincidae	<i>Ablepharus rueppellii</i>	Rueppel's Snake-eyed skink	LC
	<i>Trachylepis vittata</i>	Bridled Mabuya	LC
	<i>Chalcides guentheri</i>	Günther's Cylindrical Skink	VU
	<i>Eumeces schneideri</i>	Schneider's Skink	LC
Typhlopidae	<i>Typhlops vermicularis</i>	Worm snake	LC
Colubridae	<i>Dolichophis jugularis</i>	Black Whip snake	LC
	<i>Hemorrhhois nummifer</i>	Coin snake	LC

	<i>Eirenis rothi</i>	Roth's Dwarf Snake	LC
	<i>Eirenis coronella</i>	Crowned Dwarf Snake	LC
	<i>Platyceps rogersi</i>	Roger's racer	LC
	<i>Rhynchocalamus melanocephalus</i>	Black-headed Snake	LC
Viperidae	<i>Daboia palaestina*</i>	The Palestine Viper	LC

\* Described by locals but not encountered

The family Testudinidae was represented by one species, *Testuo graeca*. We observed only four individuals over 30 field trips. Locals seem to collect this animal to keep in their garden. One family in Tarqumia had eight Spur-thighed Tortoise in their garden. It is thus possible to reintroduce and enrich the local population in WAQ using these local stocks. *Testuo graeca* is listed as a vulnerable species.

The most common species of reptiles observed were *Stellagama stellio* and *Ptyodactylus guttatus* with 33 and 32 observations respectively. *Stellagama stellio* was the most common reptile in WAQ found mostly in exposed areas and at the margins of the wooded areas associated with rocky areas.



**Figure 2.** Some lizards from WAQ. A. *Phoenicolacerta laevis*. B. *Ophisops elegans*. C. *Mediodactylus kotschyi*. D. *Trachylepis vittata*.

The next most common reptile was *Phoenicolacerta laevis* (15 observations). For most other species, they were observed one or two times. We found an interesting area where *Ptyodactylus guttatus* individuals were congregated in the valley in the extreme southern area of the nature reserve. They were most active around late afternoon. This could provide a site to study social behavior and other ecological and reproductive data on this species. Most of our observations were in the area least frequented by visitors and local farmers (except for *Stellagama stellio*), indicating that human activities do have an impact on reptile biodiversity. This is similar to observations in Jordan (Damhoureyeh *et al.*, 2009). The record of *Mediodactylus kotschy* (Figure 2C) is the southern-most distributional limit of this Mediterranean species. It is known from Southern Europe and into Turkey and the Eastern Mediterranean. The closest records are in the northern parts of Palestine (Galilee) and northwestern Jordan.

Eight species of snakes representing three families were observed or reported by the locals. Family Colubridae constituted the higher number of species with five genera (Table 1, Figure 3).

All reptilian species recorded from the study area are of Mediterranean affinities and were reported from similar Mediterranean areas within the West Bank (Handal *et al.*, 2016)



**Figure 3:** A. *Eirenis lineomaculata*. B. *Eirenis rothi*. C. *Platyiceps rogersi*. D. *Typhlops vermicularis*.

## MAMMALS

A total of 19 species of mammals belonging to ten families were recorded from the study area (Table 2).

**Table 2.** Mammal species in WAQ.

Family	Species	Common name
Erinaceidae	<i>Erinaceus europaeus</i>	European hedgehog
Soricidae	<i>Crocidura leucodon</i>	Bicolored White-toothed Shrew
Pteropodidae	<i>Rousettus aegyptiacus</i>	Egyptian fruit bat
Emballonuridae	<i>Taphozous nudiventris</i>	Maked-rumped bat
Vespertilionidae	<i>Eptesicus serotines</i>	Serotine bat
	<i>Pipistrellus kuhli</i>	Kuhl's pipistrelle
	<i>Pipistrellus pipistrellus</i>	Common Pipistrelle
	<i>Plecotus christiei</i>	Long-eared plecotine bat
	<i>Myotis sp</i>	Mouse-eared Bat
Canidae	<i>Vulpes vulpes</i>	Red fox
Mustelidae	<i>Martes foina</i>	Stone marten
	<i>Vormela peregusna</i>	Marbled polecat
Spalacidae	<i>Spalax leucodon</i>	Palestine Mole Rat
Muridae	<i>Acomys dimidiatus</i>	Arabian Spiny Mouse
	<i>Apodemus mystacinus</i>	Eastern Broad-toothed Field Mouse
	<i>Mus musculus</i>	House Mouse
	<i>Rattus rattus</i>	House Rat
Hystriidae	<i>Hystrix indica</i>	Crested Porcupine
Leporidae	<i>Lepus capensis</i>	Arabian Hare

A cave in area 5 was visited three times. A fairly large colony consisting of about 150-100 Egyptian fruit bats, *Rousettus aegyptiacus*, was found. The cave is frequented by humans who light fires there. It has a fairly large opening narrowing slightly after about 20 meters but then opening into a wide chamber with a depression and an enlarged ceiling where bats hang. The fruit bat was considered an agricultural pest by the Israeli authorities soon after the foundation of the State of Israel and programs were instituted to wipe it out by fumigating caves in the 1950s as part of a national campaign. This however killed mostly the more sensitive insectivorous bats (Makin & Mendelsohn 1987; Qumsiyeh, 1996). In any case, a recent examination of its local diet sheds doubt on the hypothesis that it is a major agricultural pest (Korine *et al.*, 1999).

Preliminary analysis of bat fauna via ultrasound detector and visual observations of bat behavior in flight revealed at least six insectivorous bat species in the area and they were in order of commonality: *Taphozous nudiventris*, *Pipistrellus kuhlii*, *Pipistrellus pipistrellus*, *Eptesicus serotinus*, *Plecotus christei*, and *Myotis* sp.

All species were recorded around water sources in Hasaka and in the lower elevations of the reserve (areas 1, and 5). Of the over 60 recordings made, the most common was for *P. kuhlii* near the human habitations with over 25 recordings. The distinctive pattern for *P. pipistrellus* was recorded near Ain Hasaka (area 1) and in Beit Kahel (area 2) by ultrasound. Then confirming the finding we collected one female specimen (forearm 32 mm) with two late embryos on 24 May 2014 in the area around the spring in Ain Hasaka. This suggested a healthy population worthy of protection.

*Pipistrellus pipistrellus* was reported from one locality in northern Palestine many years ago (see Qumsiyeh 1996). The presence in WAQ (like the gecko *M. kotchyi*) is the southern-most record for this species in Palestine. Perhaps lack of earlier records had to do with methodologies (use of ultrasound and mist-netting now) and we expect to see more of this species after additional studies. For example, Benda *et al.* (2003) recorded it from Syria and Benda *et al.* (2010) showed that in Jordan *P. pipistrellus* was found in many localities ranging from the north to oasis in the deserts in the South. We now have unpublished data from more localities in the occupied Palestinian territories including other specimens in the north near Ramallah area (Qumsiyeh, unpublished data).

Tristram (1884) noted that *Plecotus auritus* (*Plecotus christie*) is “very common in all the hill country in Palestine especially the caves and tombs around Bethlehem and Jerusalem, and by the Sea of the Galilee.” However, we have only a brief recording which suggests this bat by ultrasound (see above). Bat diversity in Jordan was noted to have been impacted by insecticide use and habitat destruction (Qumsiyeh *et al.*, 1998; Amr *et al.*, 2006).

Mounds of the Palestinian mole rat, *Spalax leucodon* are quite common in Wadi Al-Quff. These mounds are found in many areas, even very rocky habitats with the exception of areas under pine trees where apparently few or no vegetation is left. We also found evidence for the presence of the Indian crested porcupine, *Hystrix indica*, via quills and feces in all areas of the park.

Sherman traps yielded four species of mice and rats and one shrew species. Our trappings in forested areas near Ain Hasaka (Area 1) and forested

areas designated number 6 and 7 showed 100% *Apodemus mystacinus*. This species was confined to Maquis Quercus remnants habitats. *Acomys cahirinus* was restricted to the rocky steppe area. Both *A. cahirinus* and *Mus musculus* were trapped near valleys and agricultural areas. The shrew was found in moist habitat under oak trees and the rat was collected near human habitation.

One Cape hare was observed on the road just above WAQ and the Stone Martin, *Martes foina* and the marbled polecat were encountered in a night walk in areas 4 and 6 respectively. The Red Fox, *Vulpes vulpes*, was observed on several occasions in areas 1, 4, 5 and 6. Numbers are hard to estimate but it may be no more than a few individuals in the whole area of WAQ. One fox had its tail damaged likely by feral dogs. The hedgehogs are common and we made three observations during late spring and early summer 2014.

More than 100 species of mammals including 32 bat species occur in different habitats in Palestine (Qumsiyeh, 1985; Qumsiyeh, 1996). We recorded 18 mammals in WAQ area (Table 1) including the five bat species. There are more species that potentially can exist in the area, based on the habitats present or on previous observations, but were not recorded during this study (Table 3). For example, we recorded an unidentified bat species via ultrasound. But clearly the large mammals are gone. In extensive survey we did not see any fresh droppings of gazelles anywhere in the park. This could be due to hunting and habitat destruction. Habitat destruction has resulted in significant degradation of mammalian biodiversity (see Qumsiyeh 2013; Qumsiyeh *et al.*, 2014).

Locals mention that they had observed gazelles (most likely the common mountain gazelle, *Gazella gazelle* IUCN Red List: vulnerable) in the area many years ago. The team intensively looked for any signs (observations, feces) of wild Artiodactyls and nothing could be found.

Locals also reported seeing Striped Hyena (Threatened) years ago but stated that there were more recent observations of jackals (*Canis aureus*) though no observations were recorded of any of these carnivores. There has been a decline in Jackal populations in Jordan and Palestine over the past 40-50 years and habitat destruction and potentially competition with the red fox can be possible explanations (Qumsiyeh *et al.*, 1993).

Table 3. Mammal species that likely also occur in the area because of habitats or from local reports. Those noted from reports by locals are marked with an asterisk (\*)

Family	Species	Common name
Rhinolophidae	<i>Rhinolophus blasii</i>	Blasius's horseshoe bat
	<i>Rhinolophus mehelyi</i>	Mehely's Horseshoe Bat
	<i>Rhinolophus hipposideros</i>	Lesser horseshoe bat
	<i>Rhinolophus ferrumequinum</i>	Greater horseshoe bat
Canidae	<i>Canis aureus</i> *	Golden jackal
Herpestidae	<i>Herpestes ichneumon</i> *	Egyptian mongoose
Hyaenidae	<i>Hyaena hyaena</i> *	Striped hyena
Mustelidae	<i>Meles meles</i>	European badger
Procaviidae	<i>Procavia capensis</i>	Rock hyrax
Suidae	<i>Sus scrofa</i>	Eurasian Wild Pig/Wild boar
Bovidae	<i>Gazella gazella</i> *	Mountain Gazelle
Gerbillidae	<i>Gerbillus dasyurus</i>	Wagner's Gerbil
	<i>Meriones tristrami</i>	Tristram's Jird

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