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Abstract: There are no reliable records of cheetahs from Israel for the 20th century, apart from one relatively recent observation that is mentioned here. Harrison (1968) states that there have been no reliable records of the cheetah for the whole of the Arabian peninsula since 1950. There are, however, two sightings from 1959 on the Beer Sheva - Eilat road and a record from Jordan of a female and her cub that were killed in 1962.

Felids in Israel

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Despite its small area, Israel has a relatively rich fauna, due to its location at the crossroads of three continents and because of the large variety of habitats and climates. Carnivores are represented by seventeen species: 1 viverrid; 1 hyaenid; 5 canids; 5 mustelids, and 5 recent felids. Two additional felids have become extinct. The lion (Panthera leo) existed until the time of the crusaders, and the cheetah (Acinonyx jubata) was last seen in southern Israel in 1959.

Most of the wildlife in Israel is legally protected by the "Wild Animals Protection Law", enacted in 1954. This law also protected all carnivores, apart from the jackal, that was only later declared a protected species. The legal protection of carnivores in Israel is reasonably well enforced. Cases of intentional killing of carnivores, mainly by shooting, are rare and carried out only by the ethnic minorities - Arabs and Druse, with whom the traditional animosity towards carnivores is still prevalent. There are, however, occasional cases of pesticide-caused mortality, mainly through secondary poisoning by feeding on poisoned pest rodents. The main human-caused mortality factor of carnivores in Israel is through road accidents. These road accidents, however, apparently do not endanger the continued existence of any species, as shown by the hyaena (Hyaena hyaena). This species has a small population in Israel (rough estimate: 150), and is very road-accident prone, with about 20 animals being killed in this way every year. Despite this, however, the population seems to be slowly increasing. One advantage to road deaths is that they provide documentation on the distribution of the carnivores concerned. For example, the recent spread of the stone marten (Martes foina) is well documented by road deaths.

The five recent species of felids occurring in Israel are: Wild cat (Felis silvestris tristrami), sand cat (Felis m. margarita), jungle cat (Felis chaus furax), caracal (Caracal caracal schmitzi) and leopard (Panthera pardus), that is now represented in Israel only by the subspecies P.p. nimr. Until quite recently P.p. tulliana occurred in Galilee in Israel, but the last specimen was killed in 1965.

1) Wild-cat (Felis silvestris tristrami)

This species was until recently quite common and widely distributed in mesic as well as in desert habitats. The preferred habitat is open Mediterranean forest in hilly areas. In this habitat they reach a high density of approximately one specimen per km². They also occurred formerly in plains, where cover was available, but these areas are now mostly cultivated. In the desert the distribution is sporadic, but they have been found in different desert habitats, even in sandy areas. Specimens from the desert are much lighter in colour than the relatively dark ones from Galilee and Golan.

The species is endangered by habitat destruction and especially by the large numbers of feral domestic cats. Feral cats compete with the wild ones for food, and interbreed with them. Unlike other carnivores, Felis silvestris cannot make use of cultivated habitats because of the competition from domestic cats. Because the feral domestic cats are larger than wild cats, they are probably dominant when competing for food and for oestrous females. Feral cats are able to build up dense populations because their main food source is found in garbage and because they produce two litters per year, whereas wild cats normally breed only once. Another danger for wild cats is feline distemper. Wild cats have no resistance whatsoever to this infection and captive-bred wild cats succumb to this infection 100 percent of the time if not vaccinated in time. Feral cats acquire resistance at an early age. Feline distemper may be one of the reasons for the decline of wild cat populations in recent years. Few nature reserves in northern Israel are large enough to ensure the survival of pure Felis silvestris tristrami. A breeding group of pure wild cats is kept at the Canadian Center for Ecological Zoology at Tel Aviv University.

2) Sandcat (Felis m. margarita)

Sandcats have been found in sandy desert habitats in Sinai (the exact localities are withheld in order not to endanger these populations) and in the Arava depression in southern Israel. The local population is morphologically and biochemically identical with Felis m. margarita from North Africa. They are restricted to sandy habitats, that unfortunately have been found to be good agricultural soil in Israel, and are now largely cultivated. There are, however, still quite large sandy areas on the Jordanian side of the Arava depression.

A field study of this species was begun recently by M. Abadi of the Nature Reserves Authority. To date, three males and one female have been trapped, fitted with radio transmitters, and released. The sand cats live in burrows, probably excavated by other animals, such as Vulpes rueppelli. Quite often they have also been found outside their burrows during the day. They occasionally move over large distances; one of the males, after having been trapped, went 8 km in one night but returned to his home burrow the next night. Remnants of spiny-tailed lizards (Uromastix aegyptius), that are very common in the area, have been found near their burrows, indicating that they feed, among other things, on this large diurnal lizard.

Two females, found at night by Z. Zook-Rimon, crouched when located by the headlights of the jeep, did not move when approached from behind, and could be picked up by hand. A young male in Sinai behaved in the same way.

A breeding group is kept at the Canadian Center for Ecological Zoology at Tel Aviv University. Young are born from spring to autumn, 2-5 kittens per litter. The captive sand cats dig much more in the sand covering the floor of the cages than do other cats. This well developed digging behaviour may perhaps indicate that they dig for food or perhaps excavate burrows for themselves.

The species is endangered in Israel through destruction of its habitat and through predation by larger carnivores such as caracals and wolves, that find improved availability of food near human settlements and reach higher than normal densities, or dogs that are associated with human activity. These carnivores, however, rarely enter the areas of soft sand inhabited by the sand cats, but may endanger them if the cats venture onto areas of harder soil, as they occasionally do.

3) Jungle cat (Felis chaus furax)

The jungle cat is fairly common in northern and central Israel near water - rivers, ponds, swamps, etc. Favourable, man-made habitats are water reservoirs and particularly fish ponds, near which they are often found as food (fish, birds and rodents) is plentiful. The typical jungle cat habitats are in lowlands, but at least in one case a family of jungle cats lived near a small pond in the hills of Galilee, 500 m above sea level. Despite their size, they generally capture relatively small prey. No cases have been recorded of their attacking adult nutria (Myocastor coypu), but they often prey on young ones. Fish are caught by the mouth, through diving into the water, and without much aid from the front feet.

Jungle cats swim willingly and often walk long distances in shallow water, where their tracks may be seen if the water is clear.

Jungle cats appear to live in families, at least while the young are being reared. In captivity males are more protective of the young than the females. This behaviour may be connected to the large difference in size between males and females.

The species is not endangered in Israel. If pisciculture methods should change from pond culture to intensive fish-farming in small concrete ponds, this would deprive the jungle cats of their most favourable habitat. There would, however, remain sufficient additional habitats to ensure the continued existence of this species.

4) Caracal (Caracal caracal schmitzi)

Caracals are quite common in Israel south of the Tel Aviv - Jerusalem line. There are generally few records north of this line, indicating a less dense population there. In 1964 the Plant Protection Department of the Ministry of Agriculture organized a large scale poisoning campaign against jackals (Canis aureus syriacus), that until then were not legally protected (this campaign resulted in the jackal being added to the list of protected wildlife). After this drastic decimation of the formerly very common jackal, hares (Lepus capensis syriacus) and chukar partridges (Alectoris chukar cypristes) displayed a considerable increase. In the following years more caracals were observed, also in northern Israel, indicating a possible competition between jackals and caracals. Jackals have the advantage in this competition, as their main food source is from garbage dumps, whereas caracals are dependent on the availability of game.

Caracals feed mainly on hares, but also on chukar and desert partridges (Ammodendron hevi), and occasionally also on hedgehogs, rodents, etc. Several cases have been recorded of caracals preying on gazelles. They also take dead chickens and turkeys that have been thrown on garbage dumps by poultry farms, and a caracal was also reported to have been seen driving a hyaena from a carcass at one of the feeding stations that are run by the Nature Reserves Authority for vultures.

A study on caracals has been carried out by Y. Wisebein in the northern Arava depression. In an area of about 100 km², 13 caracals were trapped and marked, and eight were fitted with radio transmitters. This high density is due to the fact that two agricultural settlements are situated in this area. The year-round availability of succulent green food, of weed seeds and water, has caused a considerable increase in caracal prey, mainly hares and desert partridges. Many of the caracals had home ranges that extended beyond the research area, so that the density is actually less than 13 per 100 km², but still quite high. Males have larger home ranges than females, with some overlap of home ranges and the same area may be visited by different specimens.

In the area between Tel Aviv, Jerusalem and Gaza, a dark colour morph occurs. These caracals are grey, darker on the forepart of the body, very different from the normal light reddish-brown colour. Young kittens of this morph are almost black. About 5-10% of the population in this area are of this grey morph.

The caracal is not endangered in Israel.

5) Leopard (Panthera pardus)

Three subspecies of leopard have occurred in this area: The Sinai leopard (P.p. jarvisi) that is now extinct and very little material of this subspecies exists in collections. As in the extremely overgrazed, overbrowed and overhunted Sinai very little wildlife remained, leopards had, in recent times, to prey on the goats of the Bedouin herds and were, therefore, relentlessly persecuted. They were trapped and killed in the traditional stone traps, as well as steel traps, and were shot. Tracks of at least one leopard were still seen in 1956, but by 1967 and later, no more tracks were found, and this population must be considered extinct.

A second subspecies (P.p. tulliana) existed until recently in the Galilee. Specimens of this subspecies are very big and are among the largest leopard subspecies. They must have been plentiful in the past, as in many villages in Galilee, skins of leopards were to be found in the thirties and forties of this century and there were many sight records and some records of specimens killed at that time. Possible prey were wild boar (Sus scrofa lybica), porcupines (Hustrix indica), hyrax (Procarica capensis syriaca) and jackals (Canis aureus syriacus). Because of heavy hunting pressure this food source was not very ample, apparently, and leopards preyed from time to time on livestock, with the same results as the Sinai leopards. The last specimen, an old male, was cornered in a cave in western Galilee and killed by a shepherd in 1965. As the population of the leopards in Galilee decreased, wild boar populations began to increase as did the damage caused by these pigs to agriculture, mainly to orchards.

Later observations in Galilee have not been substantiated. There are still, from time to time, reports of observations of leopards, probably belonging to this subspecies, from different localities in the Golan. A leopard population in the Golan could be in contact with a population on the only thinly settled Mount Hermon, and such a population could be a viable one, if the species were effectively protected in Syria.

P.p. tulliana is on the verge of extinction in Turkey, and as it is very rare in the Golan and on Mt. Hermon, if it exists at all, the whole subspecies is highly endangered and the prospects for its continued survival are extremely slim. The isolated, now extinct, population of Galilee did not just survive at the time when conservation in Israel became effective.

In the Judean desert, a rocky wilderness along the western shore of the Dead Sea and in the Negev (southern desert) a third leopard subspecies,

Panthera pardus nimr, exists.

The Judean desert is a habitat, that until recently, had been less influenced by human activity than other habitats in Israel. The Bedouin there hunted every form of wildlife and their herds overgrazed the sparse desert vegetation, owing to the difficult terrain, but nevertheless, all species survived, albeit in small numbers, and among them the leopards. When effective conservation began, first in the southern part of the Judean desert from the

oasis of Ein Gedi southwards, and after 1967 also in the northern part, vegetation and wildlife recovered. The most dramatic recovery was that of the leopards and one of their prey animals, the ibex (Capra ibex nubiana). The leopards that had been constantly harassed by the Bedouin, because they preyed on their flocks because of the scarcity of natural food due to overhunting, survived in very small numbers only. The first proof that leopards still existed in this area was a female, killed by Bedouin in 1964 in Nahal Zeelim (Wadi Seyal). She had two active teats and was, according to the Bedouin who shot her, accompanied by two other specimens. A year later a male was shot in north-west of Ein Gedi. From that time on, leopards were seen more often and as harassment discontinued, the leopards became bolder and less afraid of humans. People often met leopards and in order to minimize the possibility of an attack, the Nature Reserves Authority forbade camping in the area and only groups of hikers with less than 5 people. Leopards are especially attracted to the oasis of Ein Gedi - a very productive area with a population of about 120-150 ibex on an area of 3-4 km², several hundred hyrax and also porcupines, all prey animals of the leopard. Sometimes three leopards are in this area at the same time. This oasis is visited by tens of thousands of tourists and there is a kibbutz, a youth hostel and a field study center for the Society of Protection of Nature. Hyrax and ibex become accustomed to people and are very tame.

Female leopards rearing cubs often visit the settlements at night in order to prey on the numerous domestic cats and on small dogs (large dogs are generally not attacked), notwithstanding the ample amount of natural prey that is available at Ein Gedi. Members of the kibbutz objected to the presence of the leopards on their property, sometimes meeting them on staircases or at close quarters. In order to prevent possible hostile action towards these leopards (one was actually shot at and slightly wounded), the Nature Reserves Authority trapped and thereby, unfortunately, removed two such reproductive females from this small population.

Ten years ago G. Ilani of the Nature Reserves Authority began a long-term study of the leopards in the Judean desert. Several specimens were equipped with radio transmitters and their activities, home range, etc. are studied. A large amount of information has been accumulated that, hopefully, will be published in the not too distant future. One female, now very old, has been under observation for almost the whole period. This population, that developed from a very few specimens and survived the period of intense persecution, is probably very inbred and recently copulation between a female and her mature son was observed.

The rugged habitat in which these leopards, together with their main prey ibex and hyrax, live in the Judean desert, covers an area of 300-400 km². About 8 to 10 leopards may live in this area and several more in mountainous areas of the Negev, so that the whole population can be estimated at perhaps 15 to 20 specimens.

P.p.nimr is one of the smallest subspecies of leopards. (Only p.p. nanopardus from Somalia is smaller). Females generally have a weight of 23-28 kg. They lose weight when rearing a cub and gain weight when the cub is weaned. A normal-sized, but very obese female had a weight of 32 kg. This female lived near a hotel area and probably fed on domestic cats and perhaps also on food found in the garbage dump. Males have a weight of 32-35 kg, in one case of 40 kg.

The population is endangered, notwithstanding the protection it enjoys, by its small number, the restricted area of suitable habitat and by possible conflict with humans and development. Hyaenas could prey on cubs that are left by the mother for several days when she has to hunt.

6) Cheetah (Acinonyx jubatus)

There are no reliable records of this species from the Israel area for the present century, apart from one relatively recent observation that will be mentioned here. Harrison (1968) states that there have been no reliable records of the cheetah for the whole of the Arabian peninsula since 1950. There is, however, a record from Jordan of a female and her cub that were killed in 1962. The observation presented here may well refer to one of the last survivors and is, in any case, the only record from the area of Israel for this century.

On 9 December, 1959, a truck was driving on the Beer Sheva - Eilat road early in the morning at 80 km/hr. About 80 km north of Eilat the drivers saw an animal running on the road in front of the car, easily keeping its distance. When the road made a turn the animal ran straight, leaving the road, and stopped, looking at the passing truck. The drivers, who knew nothing about cheetahs, described the animal as yellow and spotted all over like a leopard, but with a thin body, very long legs, a small cat-like head and a long tail. When shown pictures of a leopard and a cheetah, they insisted they had seen a cheetah. Thirteen days later at 19.00 h, the same animal was possibly seen again for a few seconds, running in front of a driven jeep before disappearing into the night.

7) Lion (Panthera leo)

According to the Bible, in which it is mentioned by several different terms, the lion must have been quite common at that time. The species appears often on mosaics from the Roman and Byzantine periods, but it is not mentioned after the time of the Crusaders. In Galilee there is a hill called Tel el Assad (Arabic: the hill of the lion), and nearby a village called Dier el Assad (habitation of the lion), that may refer to a quite late occurrence of this species.