

Population status of jungle cat (*Felis chaus*) in Egirdir lake, Turkey

Idris Ogurlu¹, Ebubekir Gundogdu^{*2} and Ismet Ceyhun Yildirim³

^{1,2}Department of Forest Entomology and Conservation, Forestry Faculty, Suleyman Demirel University, Isparta - 32260, Turkey

³Department of Forest Entomology and Conservation, Forestry Faculty, Kahramanmaraş Sutcu Imam University, Kahramanmaraş - 46100, Turkey

(Received: March 10, 2009; Revised received: May 20, 2009; Accepted: September 18, 2009)

Abstract: This study has been conducted between years 2002-2008 in nearby Egirdir lake, which is acknowledged to be amongst the biggest fresh water lakes in Turkey. Within the scope of this study, observations have been made on one of the cat species common in Turkey, Jungle Cat *Felis chaus*, its biology, distribution, population size, behavior and food in their habitat as well as problems concerning its conservation. The findings have been compared to previous data set worldwide. Besides, the status of this species in Turkey has been briefly referred.

Key words: Jungle cat, *Felis chaus*, Egirdir lake, Ecology

PDF of full length paper is available online

* Corresponding author: bekir@orman.sdu.edu.tr

Introduction

Jungle cat has long legs and a thin body like Serval *Leptailurus serval*, a cat species living in Africa. Its feathers are mostly straw yellow brown, reddish grey and aside from the lines on its legs there is not a specific pattern available (Pocock, 1951; Heptner and Sludskii, 1972; Harrison and Bates, 1991). An old male cat caught in Astrahan reserve in Russia weighed 13 kg (Heptner and Sludskii, 1972). Under captivity, compared to females, males perform a more protective attitude towards the kittens. Sexual dimorphism can be attributed to this behavior (Schauenberg, 1979; Mendelssohn, 1989). It is observed that in nature jungle cat family walk in groups (Schaller, 1967; Mendelssohn, 1989). Allayarov (1964) detected and identified two jungle cat burrows as small holes inside dense reed thickets lined with old cane leaves and fur along rivers in Uzbekistan. Jungle cats can be seen frequently during day hours.

Additionally, these animals are good swimmers. In order to catch fish (Mendelssohn 1989) or run away from dogs or humans, they dive into water (Heptner and Sludskii, 1972).

In search of their food, Jungle cats do not merely use their sight; at the same time they employ their sharp hearing and smelling senses (Ognev, 1962). Mainly they eat gnawers (Allayarov, 1964; Schaller, 1967; Heptner and Sludskii, 1972; Roberts, 1977; Khan and Beg, 1986). Among their food types, there are big gnawers like 6-7 kg-weighting coypu *Myocaster coypus* which is a species brought to Eurasia at a later date (Dahl, 1954). Heptner and Sludskii (1972) have recorded that around a coypu raising facility, 200 Jungle cats have been entrapped during a 14 yr period. Besides jungle cats are fed by hares, birds, reptiles, amphibian, bugs and even the juvenile of big animals such as wild boar *Sus scrofa* and the chital *Axis axis* (Rathore and Thapar, 1984). Tehsin

(1996) reports that in Rajasthan-India, quite a sick Jungle cat walking with shaking legs approached bushes, ripped the leaves of *Eclipta alba* (Compositae), swallowed them and then walked some distance away, stretched and puked the food. After three gastric discharges this cat sprinted and disappeared as if it had not been sick at all. Besides it is noted in Indian medical records this plant was used in liver disorders, regulating gall bladder glands, hepatitis and digestion. Tehsin and Tehsin (1988) also report that once more in Rajasthan, it was seen that a Jungle cat hid inside bushes, waited for a grey jungle fowl *Gallus sonneratii* family's arrival, caught one of them and disappeared inside the dense bushes.

In nature, copulation periods are January-February in the Middle East (Allayarov, 1964), October in Southwest India. The births are recorded in the first days of May in Armenia. In captivity rutting period is 5 d (Schauenberg, 1979), pregnancy period is 63-68 d (Green, 1991), the interval among births is 93-131 d (Schauenberg, 1979). The average number of kitten is determined as 2,89 (Results of the observation about 82 female). Sexual maturation age known varies from 11 months (Schauenberg, 1979) to 18 months (Petzsch, 1968). An average life span is 14 yr (Green, 1991).

Felis chaus, of which English name is Jungle cat, has in reality no strong connection with closed forest, rather with water. Jungle cat occurs mainly in marshes covered by reeds and dense vegetation areas near lakes, sea shores and riversides (Robert, 1977). Despite the records which validate the existence of evergreen forests in Central Vietnam (Trinh, 1991), in Southeast Asia they typically live in non-evergreen tropical forest (Lekagul and McNeely, 1977; Feng *et al.*, 1986; Walker, 1990). It is considered that this is largely dependent on the existence of open lands inside forest. Jungle cat can also be detected inside bushes and meadows.

The Jungle cats are recorded on elevation of 2400 m above sea level in Himalayas (Guggisberg, 1975) and at the 1000 m in the Caucasian Mountains, between Black Sea and Caspian Sea (Vereshchagin, 1967). In 1930s, it was reported to be seen in the mountains on the southeast of Algeria (this place, 3000 km away from Nil deltas, Jungle cats are recorded in Africa. However in later periods (1951) a peltry purchased from a market was identified as a belonged to an African Wild cat *Felis silvestris lybica* (Kowalski and Rzebiak-Kowalska, 1991).

It is reported that Jungle cats adapt well to agricultural lands in various types. They are widely observed around forest plantations and sugarcane fields that are scattered within their natural habitat in Tropical Asia (Tikader, 1983; Khan and Beg, 1986).

The records reveal that in Israel they are more extensively distributed near fish farms and irrigation channels (Mendelssohn, 1989). Vereschagin (1967) observes that on semi-dry planes of Azerbaijan, the number of Jungle cats increased once local irrigation system extended while their number decreased in places without irrigation systems. Additionally, due to some changes taking place in some parts of Central Asia, depending on different seasons (floods, dense agricultural activities and seasonal changes in plantation types) and nomadic movement of cattle in the region to different places are also resulting in the increase and decrease of Jungle cat population (Heptner and Sludskii, 1972; Nuratdinov and Reimov, 1972; Esipov, 1983; Korneev and Spasskaya, 1983; Kuryatnikov, 1983; Belousova, 1993).

In residential areas Jungle cats are frequently observed while they catch chicken. Around Srinagar, particularly in Cashmere, Jungle cats are reported in almost every old building (Pocock, 1939). Also, lately they have been caught reproducing in an old building near the coconut plantations in South India.

Jungle cats are particularly well adapted to agricultural lands which have increasing numbers of gnawers and artificial basins. Unfortunately, in their natural distribution areas, particularly in dry lands, the fact that natural basins go deteriorating still constitutes a threat (Allayarov, 1964; Belousova, 1993; Dugan, 1993). Thousands of Jungle cat furs, which are illegally traded, are disposed in India (Shomita *et al.*, 2004).

Jungle cat is widely distributed from Lower Egypt, Israel, Jordan, Syria, Iraq, Iran and Asia Minor to Transcaucasia and north along the west coast of the Caspian sea to the lower reaches of the Volga and east through Turkmenistan, Tadjikistan, and Kazakhstan to Chinese Turkestan, Afghanistan, Baluchistan, Nepal and south through the Indian subcontinent to Sri Lanka, and Burma, Thailand, Indo-China and Yunnan.

In Egypt and Iraq the jungle cat appears to prefer swampy ground and reed beds, while in India, they live in woodlands, open plains, grasslands, arid scrublands and agricultural areas (corn fields and sugarcane plantations). Jungle cats are found from sea-level to 2,400 m in the Himalaya (IUCN/SSC Cat Specialist Group

in 1986; Nowell *et al.*, 1996). In countries such as China, which are situated on the verge of their natural distribution range, they are rare (Tan, 1984, Wang and Wang, 1986; Gao *et al.*, 1987). On the other hand, Phillips (1984) reported that jungle cats are not abundant in open lands in the north and in dry zones of Sri Lanka.

It is estimated that in Central Asia, their range, in natural tugai habitat (= floodplain forest vegetation) density of the Jungle cat population per her 10 km² area is around 4 to 15 individuals (Belousova, 1993), in habitats with less densely vegetation, the density per 10 km² area is as low as 2 cats (Nuratdinov and Reimov, 1972).

The countries where its hunting is illegal are: Bangladesh, China, India, Israel, Burma, Pakistan, Tajikistan, Thailand and Turkey. Aside from the areas they are conserved the countries where its hunting is legal are: Bhutan, Georgia, Laos, Lebanon, Burma, Nepal, Sri Lanka and Vietnam. The countries where its conservation status is ambiguous are: Afghanistan, Armenia, Azerbaijan, Cambodia, Egypt, Iran, Iraq, Kazakhstan, Syria, Turkmenistan, Tajikistan, Uzbekistan (IUCN Center of Environmental Law, 1986, Nichols *et al.*, 1991).

Jungle cat belongs to four wild cat species, Bobcat *Lynx lynx*, Caracal *Caracal caracal*, Wild Cat *Felis silvestris* of which existence in Turkey is verified. The records indicate that they live in provinces of Izmir, Balikesir, Eskisehir, Afyon, Ankara, Konya, Içel, Adana, Hatay, Kahramanmaras, Adiyaman, Diyarbakir, Bolu and Samsun (Turan, 1987). However there is almost no ecological study concerning this species. Its hunting in Turkey is illegal (MAK Central Hunting Commission Laws, 2008).

Materials and Methods

Study area: This study has been conducted within the borders of Isparta province in three distinct areas of Egirdir lake, which is acknowledged to be the 4th biggest natural lake and the second largest fresh water lake in Turkey. The study was carried out on coastal patches in northern part of Egirdir lake located in Isparta province (38 00 N, 30 54 E; 918 m) from May 2002 to June 2008 at irregular intervals. Northern part of Eđirdir Lake is called as Hoyran lake by local people. This part is shallower than southern part. The deepest place of the lake (Egirdir) is 13 m. Egirdir lake has an area of 47.250 ha with protected area status as drinking and using water reserve. The lake is also an Important Bird Area. The lake gets fed by three streams and some springs. Through the only outlet of the lake in the South, water flows to Kovada lake. Four vegetation types occur in the regions - aquatic, maquis, forest and rocky area vegetation. The climate of the region is in a transition zone between Mediterranean and Central Anatolian climates. Average annual temperature is 11.9°C, average precipitation is around 571 mm (Ozkan, 2001).

Interviews have been held with local people and hunters by pre-prepared questioner to detect observation areas alongside Egirdir lake, the study field. After these interviews, in locations where

Jungle cat is believed or estimated to live, its existence has been tried to validate through direct methods or through detecting footprints, scats, etc. The land surveys conducted at Asagitirtar, Büyükkabaca plain and Kemer locations near the lake would be observation areas.

Area 1: Asagitirtar: Presence of the jungle cat in the vicinity of Egirdir lake was discovered in this area first time by a hunter's expressions. It was definitely confirmed that the animal was a jungle cat, *Felis chaus*, by the comparison of some sample pictures. The dominant plant species over the study areas is *Quercus coccifera* beside *Salix* sp., *Juniperus* spp., reeds and fruit gardens.

Area 2: Büyükkabaca plain: In this area, there is an irrigation ditch covered by reeds. On 05.04.2003, one dead specimen of a female jungle cat crashed by a car was found at the main road on the irrigation ditch. The skin of the specimen was kept in Zoological Museum of Faculty of Forestry, Süleyman Demirel University, Isparta.

Area 3: Kemer Damlari: The jungle cat probably dwells in the area that has suitable conditions with the vegetation cover. The main plant species are *Juniperus* spp. and cliffs besides wide plains close to the lake.

Taking into account the fact that cats are active during night, observation time was selected after sunset. As regard to counting and observation method, "spotlight counts" method which is a direct observation method, was applied (Ogurlu, 2003). This method was actualized by scanning the area which was 10 km long and 50 m wide as transects by a projector. Additionally during day hours, by walking in the field, indirect signs such as traces, scats, food wastes were investigated.

Morphologic data obtained from a female cat found dead in study area and also from other cats were observed in spotlight surveys.

Results and Discussion

Distribution and population size: The observations indicated that around Egirdir lake at 3 different locations Jungle cat was observed 14 times, within the same day at most 4 cats were observed (Table 1).

Morphology: During observations on 5 April 2005 in Büyükkabaca plain on the asphalt road of an irrigation channel, a female Jungle cat, hit by a car was found dead. The data obtained from morphological measurements made on this specific cat are such : Weight : 6 kg, Head-body length : 65 cm, Tail length : 27 cm, Ear length : 7 cm, Ear tuft length : 1.5 cm, Shoulder height : 42 cm, Back length height : 38 cm, Front leg height : 35 cm, Nail length : 1.5 cm, Number of teeth : 30, Chest girth : 50 cm, Fingertip – knee height : 10 cm, Paw width : 3.5 cm and Paw length : 4 cm

In area of the study, Jungle cats are mostly yellowish brown, ventral side is lighter than dorsal, neck is white, ends of the ears are

black and the back of the ears is red-like brown. A dark band extends along the back to its tail end. There are hardly distinctive dark lines on legs, a black band surrounding paw bottom and three circles on its tail end are visible. During observations, it was only once that a male cat was seen. It was reported that although males did not differ in color, they were two times bigger than females.

Habitat: In study field, Jungle cat was reported to be the highest in number in Asagitirtar. The place where Jungle cat lives is surrounded by bushes, small hills covered by maquis vegetation near lake, fruit gardens, plains, rocks and willow groups where at times floods resultant of lake have occurred. The observations revealed that population used meadow and lake shore to feed and rock cracks covered by maquis to shelter.

Around the irrigation channel in Büyükkabaca plain, many traces and slops have been detected and it became obvious that the species used under bridge as a shelter. Alongside the irrigation channel here, many nests which are acknowledged to be of the species have been found.

Diet: Jungle cats, which move to the lake-shore after sunset, mainly feed on fish. It is reported that almost every night they eat the fish leftovers of the fishermen and restaurants' garbage. Additionally, it is detected that they sneak into fish depots. However, it is noted in this study that they also feed on fresh dead animals

It is observed that mostly in winter months jungle cats feed on water birds which are killed and left to the shore which are died in fish nets. Additionally the cat found dead in Buyukkabaca plain had inside its stomach flakes, bird legs and plant grains like wheat.

Behavior: Although the members of this population act timidly, still basically in order to feed, they approach close to the places where people live. During the observation it was detected that after sunset they got more active, but it is possible to allege that the cats move around during daytime as well. The interviews with hunters indicated that in winter months and in snowy days they were seen a few times, and we also saw one during the daytime.

Our observations showed that they naturally walk quite slowly and unless necessary they did not run fast. It was observed that while hunting Jungle cat was rather precautious and silent, watched its prey carefully by crouching, at times it raised its head, looked far ahead and listened attentively for the voices.

One cat drinking water from the lake-shore climbed to the tree after noticing us, as we passed near the tree, it jumped down and swiftly disappeared.

The jungle cat's voice is stronger than those of domestic cats are. They cry as they meet the other animals and fight with each other. After hunting or running away to keep their distance from human beings, they were seen lying on rocks. Also after hunting they were found to be licking themselves for cleaning and fool around with each other. In addition to that, one cat was observed swimming.

Table - 1: Observed Jungle cats in Egirdir lake

Study area	Date	Number
Asagitirtar	07.05.2002	1
Büyükabaca	05.04.2003	1
Asagitirtar	05.04.2003	1
Asagitirtar	06.04.2003	2
Asagitirtar	11.04.2003	4
Asagitirtar	06.08.2003	1
Kemer Damlari	25.04.2004	1
Asagitirtar	02.10.2004	2
Asagitirtar	02.03.2005	3
Asagitirtar	10.06.2005	1
Asagitirtar	10.05.2006	1
Asagitirtar	11.06.2006	1
Asagitirtar	20.04.2007	2
Asagitirtar	12.09.2008	1

In lake shore and alongside irrigation channel, huge amounts of traces and under the bridge of irrigation channel great amounts of scats were found. In order to find out whether they really sneak into the fish pool inside the depot, the mud at the entrance of the building was placed. After an hour, paw traces were seen, and even a Jungle cat was seen, leaving the building, with a fish in mouth.

Conservation status: Cutting and burning the reed-beds in lake-shore and opening most part of the land to agriculture, and chemicals, used in fighting the pesticides, caused deterioration in habitat and declining in biological diversity. Dense pasturage in the meadows and oak forest near lake caused a thinning in the required vegetation for the sheltering and reproducing activities of the species. Asphalt and stabilized roads in land also accounted for the habitat split.

In terms of morphological aspects the results we obtained from our research are highly compatible with the data in literature. On the south of its natural habitat it is possible to encounter at times with the ones which have very light colors around the neck while on the north, there are darker-colored ones present (Pocock, 1951; Heptner and Sludskii, 1972; Harrison and Bates, 1991). Its ventral has a lighter color than its back. A slightly distinctive, wide and dark band extends along the back to its tail end. Its winter coat is darker and bushier compared to its summer coat (Heptner and Sludskii, 1972). Melanistic types have occasionally been reported (Pocock, 1939; Chakraborty *et al.*, 1988). Its pupils become smaller and tighter in day and rounder at night. Jungle cats have ear tufts (hair bunches) reaching 15 mm (Roberts, 1977). The end of its tail is black, the bottom and upper parts are grey brownish, lower part is yellowish brown. There are three clear, dark colored circles on it. Its tail is relatively short and about 40% of head-body length. The measurements conducted on 49 cats revealed the average tail length as 27 cm. Males are distinctively bigger than females. The average weight is 6.1 ± 1.5 kg [$n=20$] in males and 4.2 ± 1.1 kg [$n=12$] in females (Pocock, 1951). Habitat preferences of observed cats are also no different from the ones in literature. According to literature, Jungle cats can satisfy their needs in various habitats

situated in a vast geographical area. In sandy and stony land, in sparsely scattered bushes (Roberts, 1977) alongside riversides or oasis nearby (Heptner and Sludskii, 1972; Osborn and Helmy, 1980; Harrison and Bates, 1991; Belousova, 1993) they can be observed. Considering the fact that in Far Eastern countries, closed and evergreen forest type supports origin populations, still there is no evidence proving that the species uses this forest commonly (Duckword *et al.*, 2005). Consequently, it has been detected that habitat preferences of observed cats are in compliance with the characteristic preference of the species. However, it is noted in this study that they also feed on fresh dead animals. Yet in literature no such finding is available. The observations made it clear that compared to winter, this species is harder to meet in summer season. Consequently it is assumed that in habitat preference, water side with a cover to hide them also played an important role.

It is obvious that the environment where the population occurs is open to external impacts. Cutting and burning the reed beds in lake shore and opening most part of the land to agriculture and chemicals used in fighting the pesticides caused deterioration in habitat and decrement in biological diversity.

Illegal hunting, intervention with their environment, habitat fragmentation and environmental pollution are main factors threatening Jungle cat population around Egirdir lake. Illegal hunters in the area possibly shoot rare species like Jungle cat in addition to the rare bird species they try to hunt. Although in "2008-2009 Hunting Period Central Hunting Commission Laws" it is pointed that the species is under protection and subject to fine, since the fines are not dissuading and proper controls are neglected, illegal hunters are encouraged more and species like Jungle cat, among all the other rare species, greatly suffer from them.

Considering these emergent results, suggestions below can be put into agenda:

- In areas where the species is distributed, a Management Plan for Jungle cat Conservation should be prepared and put into action.
- The significance of the subject should be explained, local people should be informed about the Jungle cats and their awareness on protecting this species should be raised.
- Illegal hunting should be prevented and frequently surveillances should be made.
- In order to protect both water birds and all the biological diversity, thus to prevent the damages in habitats of jungle cats, reed beds on lake shores should in no way be dried, burned or cut.

Acknowledgments

We would like to offer our thanks to the personnel in Isparta Provincial Department of Environment and Forestry who made great contributions throughout this study and undergraduate and graduate students who all participated in area studies. Also this study supported by Süleyman Demirel University Scientific Research Project Directorate Unit.

References

- Allayarov, A.M.: Information on the ecology and geographical distribution of the jungle cat in Uzbekistan (in Russian). *Uzbek J. Biol.*, **8**, 46-50 (1964).
- Belousova, A.V.: Small Felidae of Eastern Europe, Central Asia, and the Far East: survey of the state of populations. *Lutrolo*, **2**, 16-21 (1993).
- Chakraborty, S., R. Chakraborty and V.C. Agrawal: Melanism in the jungle cat. *J. Bombay Nat. Hist. Soc.*, **85**, 184 (1988).
- Dahl, S.K.: Animal world of the Armenian Soviet Socialist Republic. Vol. 1: Vertebrate animals. Academy of Sciences of the Armenian SSR, Yerevan (in Russian). (1954).
- Duckword, J., C. Poole, R. Tizard, J. Walston and R. Timmins: The Jungle Cat *Felis chaus* in Indochina: A threatened population of a widespread and adaptable species. *Biodiversity and Conservation*, **14**, 1263-1280 (2005).
- Dugan, P.: Wetlands in danger: A world conservation atlas. Mitchell Beazley and IUCN, London (1993).
- Esipov, A.V.: The necessity for the conservation of the jungle cat. Ecological problems of the conservation of wildlife (in Russian). Nauka, Moscow. **58** (1983).
- Feng, Z.J., G.Q. Cai and C.L. Zheng: Mammals of Tibet. Beijing: Science Press (in Chinese) (1986).
- Gao, Yaoting: Fauna Sinica. Mammalia, Vol. 8: Carnivora. Science Press, Beijing (in Chinese) (1987).
- Green, R.: Wild cat species of the world. Basset, Plymouth. (1991).
- Guggisberg, C.A.W.: Wild cats of the world. David and Charles, London (1975).
- Harrison, D.L. and P.J.J. Bates: The mammals of Arabia, 2nd Edn. Harrison Zoological Museum, Sevenoaks, UK (1991).
- Heptner, V.H. and A.A. Sludskii: Mammals of the Soviet Union. Vol III: Carnivores (Feloidea). Vysshia Shkola, Moscow (in Russian). (1972). Engl. transl. edited by R.S. Hoffmann, Smithsonian Inst. and the Natl. Science Fndn., Washington DC, 1992.
- IUCN Environmental Law Centre: African wildlife laws. IUCN Environmental Policy and Law Occasional Paper no. 3. IUCN, Gland, Switzerland and Cambridge, UK (1986).
- Khan, A.A. and M.A. Beg: Food of some mammalian predators in the cultivated areas of Punjab. *Pakistan J. Zool.*, **18**, 71-79 (1986).
- Korneev, N.I. and T. Kh. Spasskaya: The jungle cat in Dagestan. Proc. Congr. All-Union Therio. Soc. (in Russian). Nauka, Moscow. **3**: 64 (1983).
- Kowalski, K. and B. Rzebik-Kowalska: Mammals of Algeria. Polish Academy of Sciences, Warsaw (1991).
- Kuryatkinov, A.L.: Numbers and the conservation problems of rare mammals of northern Osetia (in Russian). Proc. Congr. All-Union Therio. Soc. Nauka, Moscow, **3**: 13 (1983).
- Lekagul, B. and J.A. McNeely: Mammals of Thailand. Association for the Conservation of Wildlife, Bangkok (1977).
- MAK Central Hunting Commission Laws: T.C. Çevre ve Orman Bakanlığı, Ankara (2008).
- Mendelssohn, H.: Felids in Israel. *Cat News* 10:2-4, Bougy-Villars, Switzerland (1989).
- Nichols, D.G., K.S. Fuller, E. McShane-Caluzi and E. Klerner-Eckenrode: Wildlife trade laws of Asia and Oceania (*Eds.*: A.L. Gaski and G. Hemley). Traffic USA, WWF-US, Washington DC. (1991).
- Nowell, K. and P. Jackson: Status Survey and Conservation Action Plan- Wild Cats, IUCN Cat Specialist Group, IUCN, 83-85 (1996).
- Nuryatdinov, T. and R. Reimov: Ecology of the most important mammals and birds of Karakalpakia (in Russian). Tashkent. (1972).
- Ognev, S.I.: Mammals of U.S.S.R. and Adjacent Countries, Carnivora Fissipedia and Pinnipedia Vol. III Published for the National Science Foundation, Washington D.C. and the Smithsonian Institution by the Israel Program for Scientific Translations, Jerusalem. (1962).
- Ogurlu, I.: Yaban Hayatında Envanter (Wildlife Inventory). T.C. Çevre ve Orman Bakanlığı Doga Koruma ve Millî Parklar Genel Müdürlüğü Av ve Yaban Hayatı Dairesi Başkanlığı Yayınları, 208, Ankara (2003).
- Osborn, D. and I. Helmy: The contemporary land mammals of Egypt (including Sinai). *Fieldiana Zool.*, New Series **5**:1-579. (1980).
- Özkan, K.: Egirdir Gölü Havzası'nın Kuraklık Etüdü ve Tarım-Ormancilik Açısından Değerlendirmesi (Dryness study and evaluation about Agricultural-Forestry of Egirdir Lake river basin), Süleyman Demirel Üniversitesi Orman Fakültesi Dergisi, Seri: A, Sayı: 2, 75-96. (2001).
- Petzsch, H.: The cats. 2nd Edn. Urania, Leipzig (in German) (1968).
- Phillips, W.W.A.: Manual of the mammals of Sri Lanka, 2nd revised Edn., Part III. Wildlife and Nature Protection Society of Sri Lanka, Colombo. (1984).
- Pocock, R.I.: The fauna of British India, Mammalia, I. Primates and Carnivora, 2nd Edn. London: Taylor and Francis (1939).
- Pocock, R.I.: Catalogue of the Genus *Felis*. British Museum of Natural History, London (1951).
- Rathore, F.S. and V. Thapar: Behavioral observations of leopard and jungle cat in Ranthambhor National Park and Tiger Reserve, Rajasthan. In The plight of the cats: proceedings of the meeting and workshop of the IUCN/SSC Cat Specialist Group at Kanha National Park, Madhya Pradesh, India, 9-12 April 1984. Unpubl. report, IUCN/SSC Cat Specialist Group, Bougy-Villars, Switzerland. pp. 136-139 (1984).
- Roberts, T.J.: The mammals of Pakistan. Ernest Benn, London. (1977).
- Schaller, G.B.: The deer and the tiger. Chicago Univ. Press, Chicago. (1967).
- Schauenberg, P.: La reproduction du chat des marais, *Felis chaus* (Guldenstadt, 1776). [Reproduction of the jungle cat *Felis chaus*.] (in French, English summary). *Mammalia*, **43**, 215-223 (1979).
- Shomita, M., S.P. Goyal, A.J.T. Johnsingh and M.R.P.L. Pitman: The importance of rodents in the diet of jungle cat (*Felis chaus*), caracal (*Caracal caracal*) and golden jackal (*Canis aureus*) in Sariska Tiger Reserve, Rajasthan, India. *J. Zool., Lond.*, **262**, 405-411 (2004).
- Tan, Bangjie: The status of felids in China. In The plight of the cats: proceedings of the meeting and workshop of the IUCN/SSC Cat Specialist Group at Kanha National Park, Madhya Pradesh, India, 9-12 April 1984. Unpubl. report, IUCN/SSC Cat Specialist Group, Bougy-Villars, Switzerland. pp. 33-47 (1984).
- Tehsin, H.R.: Induced Emesis by Jungle Cat (*Felis chaus*), (905), IUCN Cat Specialist Group Digital Cat Library (1996).
- Tehsin, R. and F. Tehsin: Jungle Cat *Felis chaus* and Grey Junglefowl *Gallus sonneratii* (904), IUCN Cat Specialist Group Digital Cat Library (1988).
- Tikader, B.K.: Threatened animals of India. Zoological Survey of India, Calcutta (1983).
- Trinh Viet Cuong: Some data on the Carnivora in the Tay Nguyen region. M.S. thesis, Univ. Hanoi, Hanoi (in Vietnamese) (1991).
- Turan, N.: Türkiye'nin Büyük Av Hayvanları ve Sorunları (Big game animals of Turkey and its problems). Uluslararası Sempozyum "Türkiye ve Balkanlar Üzerinde Yaban Hayatı" 16-20 Eylül, Ankara, 61-82 (1987).
- Vereshchagin, N.K.: The mammals of the Caucasus: A history of the evolution of the fauna. Nauka, Moscow. Engl. transl. by Israel Program for Scientific Translations, Jerusalem (1967).
- Walker, S.: The king retreats: from his sub-continental hunting grounds the Asiatic lion has been pushed into the restricted environs of the Gir. *Illustrated Weekly of India* (1990).
- Wang, Zongyi and Wang Sung: Distribution and Recent Status of the Felidae in China. In: Cats of the world: Biology, conservation and management (*Eds.*: S.D. Miller and D.D. Everett). National Wildlife Federation, Washington DC. pp. 201-210 (1986).