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**Status, Conservation and Management
of Large Carnivores in Turkey**

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PREFACE

Compared to North and South America with 29 countries, Europe is a small scale patchwork and this has implications for wildlife management and conservation (Schroeder,1998). A young male disperser can leave Croatia, walk across Slovenia into Italy and on to Austria and back and forth several times across national borders and he will be protected by 4 national laws in 4 languages, in each place in a different way (Schroeder, 1998).

Compared to other countries in Europe, Turkey has advantages since the natural habitats are relatively larger, the same legislations are effective and same language is spoken throughout the carnivore range. Nevertheless, the problem facing Turkey in conservation of large carnivores such as gray wolf, brown bear and lynx is multifaceted. There have been technical, personnel, institutional, and political limitations for effective conservation and management historically. Swift and Holloway (1967) examined the efforts spent for conservation of wildlife and concluded that “effort to conserve Turkey’s wildlife is most inadequate”. Unlimited and uncontrolled hunting resulted in depletion of wildlife resources and brought some species on the edge of extinction (Turan, 1984). Swift and Holloway (1967) stated that “the danger is that the attention given to wildlife resources has the appearance of being too little and too late”. After 35 years, the National Report on Sustainable Development (2002) still states that “one of the most important threats to biodiversity is the excessive and illegal hunting of wolves, brown bears, Eurasian lynx and wild goat”. We should not wait another 35 years and act to reverse this whole process now.

The information presented in this report has been gathered within the framework of various projects and field surveys that I conducted in different parts of Turkey since 1998. WWF-Turkey and Turkish Ministry of Environment and Forestry have been conducting various joint activities related with carnivores such as workshops, meetings and field surveys in different parts of Turkey. I worked with the Ministry of Environment and Forestry personnel from all levels in the hierarchy, from game wardens to Deputy Ministers. This gave me chance to compare my observations against the information they had. I worked with game wardens, hunters, local people, and military personnel. This gave me chance to compare my observations with theirs.

The purpose of this report is to briefly present the current day status of large carnivores in Turkey, address the important issues and recommend actions to achieve better carnivore research, management and conservation in Turkey. I hope this report will provide a foundation on which to build new studies and it will promote a better understanding of large carnivores of Turkey.

Ö. Emre Can

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1. INTRODUCTION

The large mammals are charismatic species and they are often promoted to the public as flagship species for the conservation of all biological diversity. Carnivores arouse people's interest and humans have a natural fascination with their extraordinary stealth, speed, and strength and our natural fascination with carnivores is sufficient in itself to justify the efforts for saving carnivores (Mech, 1996). Today, presence of large mammals, especially presence of large carnivores is often considered to be a measure of regional biodiversity (Boitani, 2001). Carnivores play important and unique roles in the natural functioning of ecosystems (Mech, 1996).

Turkey has several species of carnivores that are ecologically, economically, and scientifically important. In addition to wolf (*Canis lupus*), brown bear (*Ursus arctos*), striped hyena (*Hyaena hyaena*), Eurasian lynx (*Lynx lynx*), the other carnivores species found in Turkey are as follows: Caracal (*Caracal caracal*), jungle cat (*Felis chaus*), wild cat (*Felis silvestris*), badger (*Meles meles*), jackal (*Canis aureus*), fox (*Vulpes vulpes*), (*Mustela putorius*), (*Vormela peregusna*), (*Martes martes*), (*Martes foina*), (*Herpestes ichneumon*). The Caspian tiger (*Panthera tigris virgata*) and the Anatolian leopard (*Panthera pardus tulliana*) are big cats that once had a wider distribution in the country. The Anatolian leopard is Critically Endangered and Caspian tiger is Extinct according to World Conservation Union (IUCN 2003).

The large herbivore species which form the prey base for carnivores are red deer (*Cervus elaphus*), roe deer (*Capreolus capreolus*), fallow deer (*Dama dama*), goitered gazelle (*Gazella subgutturosa*), chamois (*Rupicapra rupicapra*), wild goat (*Capra aegagrus*), mouflon (*Ovis gmelinii*), and wild boar (*Sus scrofa*) (Swift and Holloway 1967; Huş, 1974; Turan 1984; Üstay 1990; Demirsoy 1996; Pani, 1998; Can & Togan, 2004).

It is evident that Turkey is Africa in Europe. However, information is lacking on populations and the exact distribution for the majority of large mammals is not known in Turkey. Similarly, basic information on large carnivores is limited. For example: Turkey is not even mentioned in recent compilations or action plans for brown bears worldwide (Servheen et al. 1999, Swenson et al. 2001, Zedrosser et al. 2001). Due to the limited information on carnivores from Turkey, the information presented on carnivores from Turkey in international publications has been misleading. For example Asiatic lion (*Panthera leo persica*) and Asiatic wild dog (*Cuon alpinus*) is listed as a carnivore still present in Turkey (2003 IUCN Red List of Threatened Species. <www.redlist.org>. Downloaded on 28 October 2004.). Asiatic lion and Asiatic wild dog does not have distribution in Turkey. Similarly, due to the lack of field biologists working on carnivores in Turkey, misleading information has been presented to the Council of Europe, as seen in Delibes (1990) about wolf in Turkey and in Council of Europe Seminar on the Management of Small Populations of Threatened Mammals (1993) about presence of Asiatic wild dog in Turkey.

2. LEGAL AND INSTITUTIONAL STRUCTURES RELATED WITH CARNIVORES OF TURKEY

The General Directorate of Nature Protection and National Parks of Turkish Ministry of Environment and Forestry (MoEF) is the principal government organization for the protection, management and conservation of wildlife including the carnivores in Turkey.

The Terrestrial Hunting Law of 1937 (Official Gazette of Turkish Republic, 1937) constituted the legal basis for all wildlife protection, management and conservation activities since 1937. There were efforts to change the Terrestrial Hunting Law since 1967 (Holloway & Swift, 1967) but it was finally changed on 11 July 2003. Today, the new Terrestrial

Hunting Law - No: 4915 (Official Gazette of Turkish Republic. 2003) constitutes the legal basis for all wildlife protection, wildlife management and conservation. The new law also dictates to establish provincial hunting commissions in each year as the previous law. Each commission drafts decisions about issues related with hunting in their province and then draft provincial hunting commission decisions are forwarded to the Central Hunting Commission Secretariat of the General Directorate of Nature Protection and National Parks. Central Hunting Commission meets in Ankara annually. The composition of the Central Hunting Commission as determined by the Terrestrial Hunting Law is as follows:

Minister or Deputy Minister of Environment and Forestry (MoEF)

3 members representing the General Directorate of Nature Protection and National Parks of MoEF

1 member representing the General Directorate of Forestry of MoEF

2 members representing the Ministry of Agriculture and Rural Affairs

1 member representing the General Directorate of Youth and Sports

1 member representing nature conservation NGOs

1 member representing private hunting ground owners

9 members representing hunters in Turkey

1 member representing the Forestry Faculties in Turkey

1 member representing the General Command of Gendarmerie

The Central Hunting Commission members meet annually at the Ministry of Environment and Forestry facilities in Ankara for about a day to:

1. decide on the list of species that will be protected for the following year,
2. decide on the list of sites where hunting will be forbidden,
3. decide on the list of species that can be hunted for the following year,
4. decide on the hunting fees and quotas,
5. decide on all other issues related with hunting, hunters, protected species etc.

The decisions taken by the Central Hunting Commission applies to the whole of Turkey and the General Directorate of Nature Protection and National Parks publishes “Central Hunting Commission Decisions” for each year and distributes it nationwide (Turkish Ministry of Environment and Forestry, 2004).

3. CURRENT STATUS OF WOLF (*CANIS LUPUS*) IN TURKEY

Local Names: Kurt, bozkurt, canavar.

Protection Status of the Species: Not protected.

Presence of Monitoring System for the Species: None.

Established Hunting Quotas for the Species: None.

Presence of Management or Conservation Action Plan for the Species: None

Estimated Population Size: 5000-7000 individuals (Can, 2001a).

Average wolf density in Turkey: 2.2-2.8 wolf per 100 km² (Can, 2000).

Population Trend: Declining. Wolf range has reduced in the last 50 years.

Main Prey Species: Red deer, roe deer, wild boar, brown hare, livestock.

Important Regions for the Species: Eastern Turkey, northern and eastern parts of Central Turkey.

Distribution of the Species: The wolf prefers forests, steppes and other areas that have adequate prey in Turkey. Today, the distribution of the species is mainly confined to the natural habitats in Afyon, Ağrı, Aksaray, Amasya, Ankara, Balıkesir, Bayburt, Bilecik, Bitlis, Bolu, Çankırı, Çankırı, Çorum, Denizli, Erzincan, Erzurum, Eskişehir, Gümüşhane, Karaman, Kars, Kastamonu, Kayseri, Kırıkkale, Kırşehir, Konya, Nevşehir, Niğde, Ordu, Siirt, Sivas, Tokat, Van, Yozgat and Zonguldak regions. In the other cities, which are not listed here, the wolf population, if present, is very low. The wolf is totally exterminated from many areas of the Aegean part. In Thrace (the European part of Turkey), the wolf presence has been very low at least for the 50 years. In the 1960s, 6-10 wolves were shot on average in each year in Thrace. The species is present in areas with a minimum altitude of 400 meters but there are exceptions to that.

Notes on Wolf Population in Turkey: According to locals, who search and destroy the dens: The average litter size is 3-4 but they report to find occasionally 5-8 pups in a single den. Can (2000) observed 11 to 14 wolves in 5 packs in winter in Bolu. A pack composed of 10-13 wolves were observed in Konya (Can, 2001b). Sayar (1994) reports a pack of 5-8 wolves in Yozgat. The estimated density of wolves in Bolu was 2.2-2.8 wolves per 100 km² (Can, 2000). The wolf caused mortality for the wild boar population was estimated to be more than 16% (Can, 2000). Can (2001a) estimates the total size of the wolf population in Turkey is 5000-7000 individuals.

Prey Species: The primary prey species for wolf in Turkey are: Red deer (*Cervus elaphus*), roe deer (*Capreolus capreolus*), wild boar (*Sus scrofa*), brown hare (*Lepus europaeus*) and livestock in Turkey (Can, 2000).

Legal Status, Management and Conservation: The species is considered as pest species and it is not a protected species in Turkey. There are no established quotas for wolf hunt in Turkey. In practice, the species can be hunt throughout the year without any established limits. The authorities also do not keep the number of animals killed therefore there is no historical data on that as well. The wolf is included in Appendix II (strictly protected species) of the Bern Convention. But Turkey has made an exception for wolf protection.

Wolf and Humans, Wolf-Human Conflict: The urban people are generally unaware that the species is a present day fauna element in Turkey whereas the rural people generally tolerates the presence of the species. The attitude of Turkish people to the wolf has traditionally been more positive to wolves when compared to the attitudes held by Europeans over the centuries. Although the perception of wolf differs from one region to another due to cultural differences in Turkey, Turkish people generally doesn't perceived the wolf's presence as a serious threat to their families like Europeans perceived in the past. Many people in Turkey believe the wolf is something to be afraid of but something to respect as well. In fact, the wolf is a legendary animal for Turks. In an ancient Chinese text, the following is written about ancient Turks:

“The wolf head was mounted on the top of their flags. Their warriors were called as *fu-li* (author's note: fu-li means wolf in ancient language). They were born from wolves”.

In ancient Anatolian civilizations like Hittites, wolves were considered to be friends of gods, especially with forest gods. In Turkish, there are many proverbs in which the wolf is mentioned: The wolf loves foggy weather; the wolf knows its prey; the wolf changes its pelt but not its habits; the hungry wolf even attacks a lion.

As elsewhere, the negative attitude of Turkish rural people towards wolves and other large carnivores roots in two main conflicts: with hunters who blame wolves for reducing game abundance and availability, and with livestock breeders who blame wolves for livestock

depredation. But depredation is the main reason for extermination of wolves in Turkey. There is no compensation for damage caused by wolves in Turkey. Depredation occurs in all parts of Turkey where wolves and livestock are found together. The wolf prefers the sheep most as domestic prey in Turkey. After sheep, the wolf prefers cattle, horses, donkeys and goat. The wolf also utilizes the garbage in areas close to cities in Eastern Turkey.

The locals used to have larger herds and guard dogs in the past. However, the size of the herds decreased during the last years and many of the livestock owners gave up using guard dogs in many places. Since the herds became smaller, most of the livestock owners left their animals unattended to decrease the costs associated with herds, hence the overall damage to livestock caused by wolves might have increased in Turkey.

Although there has never been a documented human death or serious injury caused by healthy wild wolf in the United States of America since late 1800's and there is no enough evidence to support the idea of non-rabid wolves attacks and kills humans in Europe; occasional wolf attacks to humans are reported mainly from Eastern Turkey. Wolf attacks have been mainly reported during winter period from Eastern Turkey and some of those attacks were resulted in human injury according to local sources. The attacks are more frequent in areas close to villages and roads. However, such attacks have never been properly recorded and investigated. Rabies is still a serious issue in Turkey. It is known that the rabies is more related with foxes rather than wolves since foxes are more related with rodents. Every year, several cases of rabies occur, and some of the virus infected people die.

It is difficult to have reliable figures and information on rabies since the authorities sometimes hide the cases mainly due to the reason not to cause panic in the public. There is no reason to be afraid of wolves in Turkey since no incident was reported during the million's of people visit to recreational areas where nature is relatively wild and impact.

Major Threats: Most of the wolf killing results from poisoning, organized wolf hunts and accidental hunts. Most of the wolves are killed during wild boar hunts. There are 8 million forest villagers living in 17,797 forest villages according to the National Report on Sustainable Development (2002). The actual number can be higher than this official number and most of those villages are in wolf range. Can (2000) reports that the 29-36% of the wolf deaths in one year in Bolu was caused by human. Considering the number of forest villages (17,797), the official population size of villagers (8,000,000 people) and note that most of those people live in wolf range, it is safe to state that 1000-1500 wolves are removed by humans in a year in Turkey. But there are no official records kept on the number of wolves killed in a year. Trapping was used in the past when the poisons were not easy to get but later they became available so poisoning became a wide spread mean of predator control in Turkey. The local authorities used poison in different parts of Turkey until the early 1990s and some of the personnel still consider the use of poison for the control of wolf in some areas. Nevertheless, poisoning activities are not widespread today compared to the period before 1980s. Local people occasionally use poison for the extermination of carnivores in some parts of Central Anatolia, in the northern parts of Taurus Mountains range in Mediterranean part of Turkey, in Eastern and Southeastern Anatolia.

The wolf was is considered as a pest species since 1937 in Turkey. The current Terrestrial Hunting Law and the Central Hunting Commission decisions for 2004-2005 do not mention any limits for wolf hunts either. As a result, wolf is still killed without any limits throughout the year in Turkey. It can be deduced that the wolf population has been declining during the last 50 years due to extermination efforts and indirect effects of forest fragmentation, habitat degradation which resulted in the shrink of suitable habitat for the wolves and its prey base. The major threats for the wolf are ongoing extermination efforts, change in species dynamics through prey base decline, persecution and habitat loss-degradation.

General Conservation Recommendations: The most important conservation measures for wolf in Turkey are policy-based actions (legislation development and implementation for effective wolf management), research actions (on wolf-prey interaction, harvest levels, wolf-human conflict), communication and education (awareness, capacity building of Ministry of Environment and Forestry personnel on theoretical and practical aspects of wildlife management such as designing surveys, collecting systematic data, analyzing and reporting data, wolf handling techniques), habitat and site-based actions (identification of new protected areas, expansion of present ones). Specific recommendations are presented in “Recommendations for Effective Carnivore Conservation and Management in Turkey” part.

4. CURRENT STATUS OF BROWN BEAR (*URSUS ARCTOS*) IN TURKEY

Local Names: Ayı, bozayı

Protection Status of the Species: Protected.

Presence of Monitoring System for the Species: None.

Established Hunting Quotas for the Species: None.

Presence of Management or Conservation Action Plan for the Species: None

Estimated Population Size: <3000 individuals, probably as 3-5 subpopulations. (Estimate should be considered only as an indicative of the general status of the population)

Average brown bear density in Turkey: 1 brown bear per 100 km² in southern Bolu (Can, 2000). Unknown for other areas.

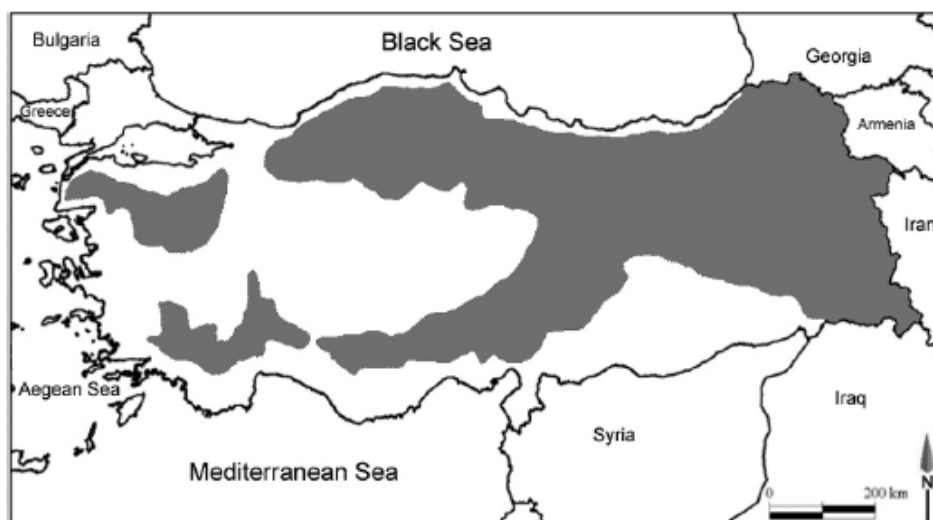
Population Trend: Declining. Bear range has reduced in the last 50 years.

Main Food and Prey Species: Acorns (*Quercus*), beechnuts (*Fagus*), chestnuts (*Castanea*), hazelnuts (*Coryls*), plums (*Prunus*), wild apples (*Malus*), wild pear (*Pyrus*), bilberry, ants, bees, wasps, occasionally livestock.

Important Regions for the Species: Northern and Eastern Turkey.

Distribution of the Species: The brown bear is continuously distributed throughout the Black Sea region from Bolu to Artvin and the eastern Black Sea region probably supports the largest brown bear population in Turkey (Can & Togan, 2004). According to Can & Togan (2004), the distribution of brown bears is confined to the forest and intact natural habitats of Ankara, Antalya, Artvin, Bingöl, Bitlis, Bolu, Bursa, Çanakkale, Çankırı, Elazığ, Erzurum, Giresun, Gümüşhane, Hakkari, Isparta, Karabük, Kars, Kastamonu, Malatya, Muğla, Muş, Ordu, Sakarya, Siirt, Sivas, Şırnak, Tokat, Trabzon, Tunceli, Van, and Zonguldak regions (Fig.1).

Figure 1. Approximate distribution of brown bear in Turkey (from Can & Togan, 2004b).



Functional habitat in the former is separated into more or less isolated areas with some inter-connectivity. Bear populations in eastern Turkey may be divided into several sub-populations. Distinct populations may have formed in western Turkey because forest corridors have become unusable as a result of human activities.

Habitat type and quality are presumably key factors influencing brown bear distribution. Important habitat for brown bears is provided by broad-leaf deciduous and conifer forests in the Black Sea region from 500 to 1,500 m; humid and sub-humid coniferous forests in the high mountains of northeastern Turkey from 1,000 m to 2,000 m; dry oak (*Quercus spp.*) and pine (*Pinus nigra*, *P. sylvestris*) forests in the hinterlands of the Black Sea from 500 to 1,500 m; and dry forests of East Anatolia from 850 m to 2,700 m. Lower Mediterranean belt forests from 800 m to 1,500 m, Mediterranean mountain forests from 500 m to 2,000 m, and dry black pine (*P. nigra*), oak, and juniper (*Juniperus excelsa*) forests ranging from 1,000 m to 1,500 m are also important potential habitat. The forested areas in eastern Turkey are less continuous than in the Black Sea region.

Legal status and management: The brown bear is a protected species according to Central Hunting Commission for the period 2004-2005. However, the Directorate may allow recreational hunting of brown bears for a fee. The Central Hunting Commission, set the brown bear hunting fee at € 3,500 for 2004-2005 period with a fine of € 8,000 (15,000,000,000 Turkish lira at the 2004 exchange rate) for illegal hunting of brown bears (Turkish Ministry of Forestry and Environment, 2004). According to the authorities, hunting of bears should be permitted to control damage to beehives, crop depredation etc. The Directorate is considering setting quotas and opening brown bear hunt during the preparation of this report.

Brown Bear and Humans, Brown Bear-Human Conflict: Bear attacks on humans have been reported in Artvin, Trabzon, Rize and in some other parts of northeastern Turkey, but there are no systematic records kept on bear attacks to humans by authorities. However, communication with local forestry and military personnel suggested that most of the bear attacks on humans in the Black Sea region result from close encounters with mother and cubs (Can & Togan, 2004). In fact, the size and physical strength of brown bear makes it capable of injuring and killing humans easily. Attacks on humans do not appear to be a result of predatory behavior but as a result of self defense and defense of cubs or a carcass. Sometimes, bear attacks on humans result in deaths in Turkey. A recent incident happened on 15.07.2003 in Kastamonu and one local villager was killed by a brown bear in Devrekani sub-province (Kastamonu Governorship Official Letter No. 729, 2003). I have traveled to the area and interviewed the local gendarmerie and local people. Gendarmerie states that such event has never happened during the 10 years period in their region. Gendarmerie officer concluded that the incident resulted in the death of the person due to threatening behavior of the person and the presence of a bear cub or cubs is highly likely, as also some local people reports.

Brown bear damage to livestock appears to be much less common than damage caused by wolves and although there are no records kept on damage to livestock by bears, local people have reported that brown bears prefer sheep and cattle as domestic prey (Can & Togan, 2004).

Unlike in Europe, where extermination of bears was often encouraged as a means of eliminating livestock depredation, no extensive bounties have been organized by the state for brown bears in Turkey. However, local authorities might have organized local bounties in some areas in the past. There is no compensation for damage caused by brown bears in Turkey.

Some national surveys conducted in Europe have shown that people from the countryside are generally more negative than urban dwellers and young age and higher education is often associated with a more positive attitude towards bears (Swenson, *et. al.*, 2001). The same probably applies to Turkey. Public image of bear is generally better than wolf in Turkey. It is interesting to note that in the "Human Attitudes to Brown Bears Survey in Rize" conducted by Can & Lise (in preparation) showed

that 37% of the people that lives in rural areas of Rize consider wolves more dangerous compared to bears. But, wolf is not present in Rize and according to the Directorate; there is serious conflict between humans and bears in Rize. Whereas, 27% of the same group stated that bears are most dangerous among all the large carnivores in Turkey. 36% of the survey participants coming from 40 villages reported that wolves and bears are equally dangerous.

Major Threats: Brown bear populations in the western and eastern Black Sea regions are poached to limit the damage caused by bears and for bear fat, which is believed to be of medicinal value. The illegal kill rate of brown bears is unknown (Can & Togan, 2004b). The ongoing Baku–Tbilisi–Ceyhan crude oil pipeline project (a large-scale, international project starting in Azerbaijan and passing through Georgia and Turkey) is notable because the pipeline route passes through the provinces of Kars, Erzurum, and Erzincan, which include remote and intact mountainous habitats for brown bears (Can & Togan, 2004). Hunting for wild boar with dogs is the most frequent type of hunting, and bears are killed occasionally during those hunts. However, such kills are hidden in the villages because the animal is a protected species and illegal hunting fee is very high. Illegal killing may also occur unintentionally when bears are killed by snares set illegally for wolves, red deer, and roe deer, or by poisoned baits illegally set for wolves and lynx.

General Conservation Recommendations: The most important conservation measures for brown bear are policy-based actions (strict implementation of current legislation to limit poaching of brown bears), research actions (on brown bear range, connectivity of populations, human-bear conflict), communication and education (awareness, capacity building of Ministry of Environment and Forestry personnel on theoretical and practical aspects of wildlife management such as designing surveys, collecting systematic data, analyzing and reporting data, bear handling techniques), habitat and site-based actions (restoration of brown bear habitat, identification of new protected areas). Specific recommendations are presented in “Recommendations for Effective Carnivore Conservation and Management in Turkey” part.

5. CURRENT STATUS OF STRIPED HYAENA (*HYAENA HYAENA*) IN TURKEY

Local Names: Sırtlan, çizgili sırtlan, andık

Protection Status of the Species: Protected.

Presence of Monitoring System for the Species: None.

Established Hunting Quotas for the Species: None.

Presence of Management or Conservation Action Plan for the Species: None

Estimated Population Size: <500 individuals, probably as 3-4 subpopulations (estimate should be considered as indicative of the general status of the population)

Average Hyaena density in Turkey: unknown, very low.

Population Trend: Sharply declining.

Main Prey Species and Food: Human associated organic matter, vegetables and fruits, remains of wolf.

Important Region for the Species: Southeastern Turkey.

Distribution of the Species: The species is present in Gaziantep, Adıyaman, Batman, Mardin, Şırnak, Hatay and Siirt (Can, 2004a; Can & Lise, 2004). The area between Şanlıurfa and Ceylanpınar contained suitable habitat and Derik/Atalar and Darğaçtı areas (Mardin) are also important for the species (Can & Lise, 2004). Kumerloev (1967) writes of striped hyena in Diyarbakır, there is no evidence of the species in that area today. There are rumors about the presence of hyaena in western Turkey but we have not confirmed those by field work. Striped hyena is mainly confined to areas

between 250-2500 meters in bare areas, dry wooded habitats (Callabrian pine, Kermes oak and Eastern Anatolia Scrubland) and the species prefers open or rocky country in South East Anatolia (Can & Lise, 2004).

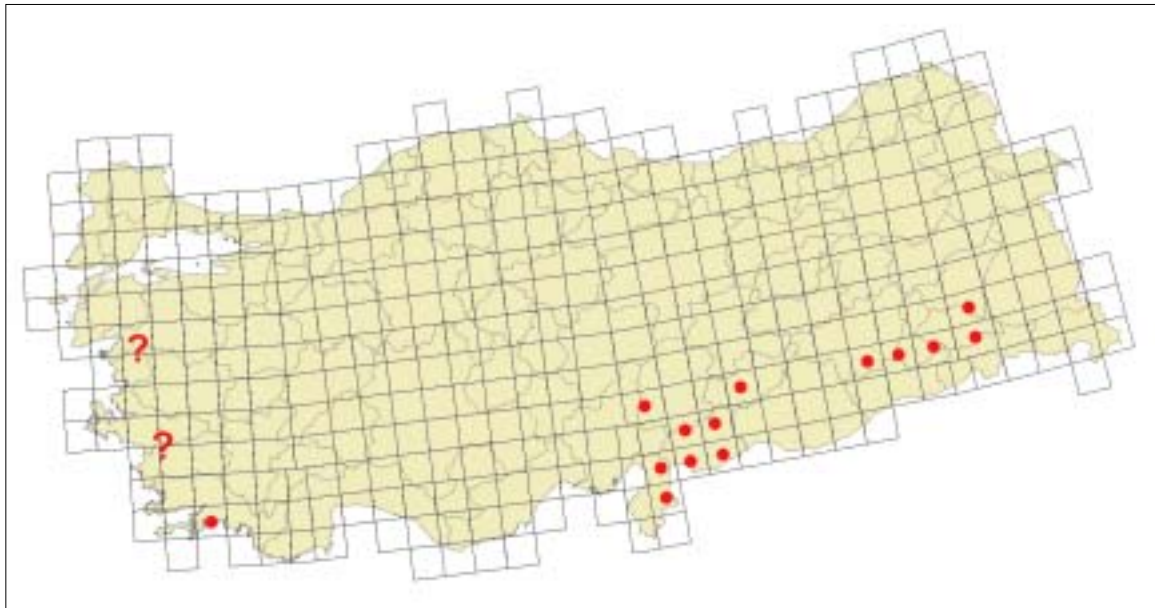


Figure 2. Distribution of striped hyaena in Turkey according to approximately 50 km X 50 km squares. Each red dot represents hyaena presence in that particular square (from Can 2003).

Diet: The diet of striped hyaena in Southeastern Turkey consists of human associated organic matter, vegetables and fruits, variety of vertebrates, invertebrates, carrion, remains of wolf, livestock.

Legal Status, Management and Conservation of Species: The national authorities were reluctant to include the species in the lists of Central Hunting Decisions in the past since the species was generally considered to be extinct in Turkey. Mills and Hofer (1998) state that there are no recent hyena records from Turkey in the “IUCN Hyaenas Status Survey and Conservation Action Plan”. The presence and distribution of the species was recently revealed during the South East Anatolia large mammal survey in 2002 (Can, 2002a). The photograph of a hyena killed in Nizip, Gaziantep in 2001 was also published for the first time in Turkish press (Can, 2002b). The results of this survey were presented at the 4th European Congress of Mammalogy which was held in Czech Republic between 27 July -1 August (Can, 2003). The study results were presented to the Ministry of Environment and Forestry by WWF-Turkey in 2002 and 2003. WWF-Turkey asked to get protection status for hyaena in 2002 and 2003. However, the species received protection status only after it was live trapped by a local hunter in Hatay, Turkey in 2004 (Can, 2004a).

Hyena and Humans, Hyena-Human Conflict: In many areas the species is heavily persecuted (even eaten to supplement the poor local diet) but in others it is treated as a mythological animal and shown a kind of respect. This difference in attitude is perhaps related to cultural and religious backgrounds (Can & Lise 2004). The animal is relatively easy to spot in Southeastern Turkey due to type of the habitat and since the hyenas live very close to the villages, it is easy for the local people to point out the hyaena dens and caves. The locals also kill the animals during night when they come to the gardens for fruits and vegetables. The hyaena pelt does not worth as much as past but it is still possible to find hyaena pelts in shops in sub-provinces.

Major Threats: The major threat to hyaena in Southeastern Turkey is extermination efforts mainly by poisoning, trapping.

Conservation Recommendations: South East Anatolia supports the largest population of striped hyena in Turkey. The project's work has indicated that the species is comparatively widespread but no estimate of population is available. Therefore more detailed surveys about numbers and distribution,

local attitudes/persecution of the species and ecological factors (for example are the populations on either side of the Euphrates around Birecik separate?) are required so that a conservation action plan can be developed. Specific recommendations are presented in “Recommendations for Effective Carnivore Conservation and Management in Turkey” part.

6. CURRENT STATUS OF EURASIAN LYNX (*LYNX LYNX*) IN TURKEY

Local Names: Vaşak, üşek

Protection Status of the Species: Protected.

Presence of Monitoring System for the Species: None.

Established Hunting Quotas for the Species: None.

Presence of Management or Conservation Action Plan for the Species: None

Estimated Population Size: unknown, but probably as several isolated subpopulations (Can & Breitenmoser, in preparation).

Average Lynx density in Turkey: no reliable estimate.

Population Trend: Declining. Lynx range has reduced in the last 50 years.

Main Prey Species: roe deer, chamois, brown hare and rodents

Important Region for the Species: Eastern Black Sea region, Mediterranean part of Turkey, Eastern Turkey.

Current Distribution of the Species (from Can & Breitenmoser, in preparation): The lynx inhabits large deciduous mixed and coniferous forest, open wooded regions. Today, the distribution of the species is mainly confined to the intact natural habitats of Çanakkale, Balıkesir, Bolu, Çankırı, Karabük, Kastamonu, Zonguldak, Antalya, Karaman, Mersin, Niğde, Adana, Şırnak, Hakkari, Siirt, Van, Bitlis, Diyarbakır, Malatya, Elazığ, Bingöl, Muş, Erzurum, Kars, Artvin, Trabzon, Giresun, Erzincan, Tunceli, Tokat, Ordu, , Mardin and Amasya regions. In other regions: Ankara, Eskişehir, Afyon, Muğla, Isparta, Konya, Ağrı, Kahramanmaraş and Sivas, the species is in low numbers. The lynx population in Turkey is probably present as several subpopulations some of which are isolated from each other. The field survey conducted by Can and Lukarevskiy (2004) shows that the relative density of lynx is highest in Eastern Black Sea region among the other parts of Turkey. Turan (1984) presented a single map showing the distribution of lynx and caracal and later Serez (1992) redraw the same map. Today, it is apparent that Turan (1984) mistakenly accepted some of the lynx records of local people as caracal and draw the distribution map accordingly. This may also apply to Kumerloev (1967). For more discussion on this issue see “the Status of Leopard in Turkey” section of this report.

Although Turan (1984), Serez (1992) and Demirsoy (1996) states that Iberian lynx (*Lynx pardina*) is present in Turkey. Shortly, there is no data to support this conclusion. Iberian lynx does not have presence in Turkey.

Prey Species: In Black Sea region: roe deer (*Capreolus capreolus*), red deer (*Cervus elaphus*) in North Eastern Black Sea region chamois (*Rupicapra rupicapra*) and in Mediterranean part of Turkey wild goat (*Capra aegagrus*) are the main prey species. In addition to those species, hares and rodents also form the prey base for lynx in Turkey (Can & Breitenmoser, in preparation).

Legal Status, Management and Conservation of Species: The species is listed as protected species according to the Central Hunting Commission for the period of 2004-2005. The penalty fee for lynx poaching is equivalent of € 2100 (4,000,000,000 TL at 2004 rate).

Lynx and Humans: The lynx in Turkey is less known by the public when compared to other carnivores. When compared to wolf and brown bear, the species is seen as a minor problem. Nevertheless, local people and local authorities used poison to exterminate the species from some sites, mainly in Southern Turkey. The lynx damages to domestic goat herds in Southern Turkey but this is a consequence of unattended pasturing in carnivore habitat as is the case for Europe. Lynx pose no danger to people. Since lynx is an elusive species and the species is rare in Turkey, locals rarely

spot lynx in the field. The presence of lynx is unnoticed in many places by the local people and it is usually noticed when it gives damage to livestock.

Major Threats: Poisons have been used to exterminate the species from areas where there are game species and livestock. The species has been blamed for the decline of wild goat populations in the Southern Turkey. In the period of 1954 to 1956, a fairly intensive poisoning campaign was started by the locals by using Folidol insecticide (E. 605) in Southwestern Turkey (Swift & Holloway, 1967). Similar campaigns probably have been started in other parts of Turkey. In some protected areas, such as in Termessos National Park in Antalya, local authorities used poisoned baits exterminate the species within the protected area boundaries in 1980s. Today, it is still believed that the wild goat population will increase if the species is exterminated from the region. The lynx pelt was probably the most valuable pelt after tiger and leopard in Turkey. But it is illegal to keep and sell lynx pelts; therefore it is not popular as it was in the past. It has been observed that sometimes locals take the lynx kittens from the dens to sell them to zoos found in different parts of Turkey.

Conservation Recommendations: The information available for the species in Turkey is very limited. The most important conservation measures for lynx in Turkey are research actions (on exact distribution, genetic status, prey base, human-lynx interaction, threats, connectivity between subpopulations), policy-based actions (strict enforcement of legislation that lists the species as a protected species), communication and education (awareness, capacity building of Ministry of Environment and Forestry personnel on theoretical and practical aspects of wildlife management such as designing surveys, collecting systematic data, analyzing and reporting data), habitat and site-based actions (identification of new protected areas, expansion of present ones). Specific recommendations are presented in “Recommendations for Effective Carnivore Conservation and Management in Turkey” part.

7. CURRENT STATUS OF LEOPARD (*PANTHERA PARDUS*) IN TURKEY

Taxonomists recognize two subspecies of leopard in Turkey, the Anatolian leopard *Panthera pardus tulliana* and North Persian leopard *Panthera pardus saxicolor*. North Persian leopard is found mainly in Iran (Dr. Viktor Lukarevskiy personal communication, Ankara, Turkey, 2003) and there have been confirmed records from eastern parts of Turkey. Records from elsewhere in Turkey are considered to be Anatolian leopard, with the last definite Anatolian leopard killed reported in a newspaper from Beypazarı in 1974.

Past records appear to show a patchy leopard distribution in east Turkey supporting the existence of a separate subspecies in the west and south (the area where the leopard’s main centre of population was believed to be), but when all leopard records are considered together, the distribution seems to be continuous from west to east across the country (Can & Lise, 2004). With no significant geographical barrier in Turkey to divide two subspecies, the validity of Anatolian leopard *Panthera pardus tulliana* as a separate subspecies is therefore questionable. For this reason, I have chosen to follow the conclusions of Miththapala *et al* (1996) and consider the two leopard subspecies as one.

Distribution of the Species: The historical distribution of the species was mainly confined to western and Mediterranean part of Turkey. The species was present in the suitable habitats found in: İzmir, Aydın, Muğla, Denizli, Antalya, Mersin, Adana, Hatay, Gaziantep, Şanlıurfa, Adıyaman, Diyarbakır, Batman, Şırnak, Siirt. In addition to those, there are few records from Bolu but there is insufficient evidence to suggest that the leopard range included Bolu region. There are also one or two records from Erzurum-Kars according to the sources in the literature. It is likely that the individual that is mostly cited as the “last Anatolian leopard record in Turkey” killed in Beypazarı in 1974 originated from Ankara Zoo, Ankara. I was told by a source who wants to be anonymous that the individual was given as a present from the zoo to a wealthy person who has a private farm in Çubuk, Ankara in 1973. However, the leopard escaped nearly a year later from the private farm according to that source. This story at least explains from where the leopard killed in 1974 came. In fact, in the 1980s, one particular wealthy person was known to keep at least two leopards at his office in Ankara (Tansu Gürpınar, personal communication, 2001, Ankara, Turkey).

The leopard did not have historical presence in northern Turkey (western Black Sea region, eastern Black Sea region etc.) and those records mentioned in some sources probably belong to lynx

since these areas are within lynx range. The recent claims (Başkaya and Ertuğ, 2004) about the presence of leopard in Eastern Black Sea Mountains also belongs to lynx and probably some other species. During the last years, travelers, biologists, amateur naturalists, local authorities, pet shop owners and some others have claimed to find evidence on the presence of the leopard in different parts of Turkey.

Some of them claimed to photograph the leopard tracks and even the animal itself. Such people certainly received media attention and appeared in television programs but they are unable to present any hard data until today.

I had surveyed in different parts of Turkey and investigated various rumors about the presence of leopard in western, Mediterranean and northern parts of Turkey between 2000-2004. Some of those surveys were within the framework of WWF Anatolian Leopard Project supported by WWF-US and others were joint surveys conducted with Ministry of Environment and Forestry. Prof. Dr. Wilfried Buetzler helped me to get DNA tests done on selected scat samples in Germany in 2001 and Dr. George Schaller helped me to get DNA tests done of 3 selected scat samples in US. Selected scat samples contained wild boar and wild goat hair and they resembled to leopard scat in size and shape. However, the results showed that the scats belonged to all lynx, except one which was a dog.

Perhaps, the only time where I might have come close to a leopard was in Antalya region in 2001. In one of the sites where there were recent leopard sightings by local people, two wild boars were killed and the description of the two kills and the predation scene by the forest guards who found the dead animals in the same night clearly indicated that a big cat. I and an officer from the Directorate investigated the incident. Depending on the detailed descriptions of the two forest guards, we presented a confidential report which also includes a recommended study in that area to General Directorate of Nature Protection and National Parks in 2001. None of our recommendations were followed. In the following years, In 2003, I had chance to conduct a survey in that area together with Dr. George Schaller from Wildlife Conservation Society, US and later with Dr. Viktor Lukarevskiy in 2004. None of those surveys produced hard data on the current day presence of leopard. Today, WWF-Turkey is conducting opportunistic surveys in some other identified areas as recommended by Dr. Schaller.

Gathering species data from local sources (villagers, hunters, forestry officers, game wardens etc.) caused some misleading results about the presence and distribution of some large mammals in Turkey. The people including some of the experienced hunters confuses lynx, caracal and leopard with each other. In addition, the common names of some species differ from region to another among the locals. As an example: The locals name the wild goat as “deer” in southern Turkey. Therefore a visitor depending on local information might note “deer” presence in that particular area (given that he/she does not filter the information, consider the habitat etc.). Similarly, the leopard is named by the locals as “kaplan”, that is “tiger” in English. One might be collecting historical leopard records when local mention tiger or vice versa. Similarly, one can collect red deer data when locals mention “gazelle” in western Black Sea region. Due to those and similar reasons there seems to be some confusion in Kumerloev (1966), Turan (1984). Since those sources have been widely used by others, such confusion had lasted until today. This statement applies to some historical lynx, caracal, leopard, deer and roe deer records. This inevitable sometimes.

8. CURRENT STATUS OF CASPIAN TIGER (*PANTHERA TIGRIS VIRGATA*) IN TURKEY

Earlier in the 20th century, the presence of the Caspian tiger had been known by Turkish (Turkish Republic Official Gazette, 1937). Yet, when the Caspian tiger was declared Extinct in the world, international zoologists did not accept the idea that the Caspian tiger distribution range extended as far as eastern Turkey (Dr. George Schaller, Ankara, Turkey, personal communication, 2003). In fact, the species was officially a pest species until 11.07.2004 in Turkey. In the 1970's, surveys conducted by Paul Joslin in Iran turned up no signs of the Caspian tiger and the conclusion was made that the Caspian tiger had been extirpated. International cat experts only became aware of the presence of the Caspian tiger in Turkey after a tiger was killed in Uludere, Şırnak 1970 (Uludere was a sub-province of Hakkari in 1970). Three years later, a botanist visiting the area saw and photographed the tiger pelt

(see the color photographs in the appendix) and published the story (Baytop, 1974). Nevertheless, there had been no historical efforts by the national authorities or international conservation community to reveal the distribution of the Caspian tiger in eastern Turkey.

Eastern Turkey holds the remotest and wildest land of Turkey. The members of Turkish Armed Forces, who has extensively worked in different regions of Turkey, describes the region as the most wild of Turkey (Kundakçı, 2004). Due to the harsh climate of the region, some sub-provinces and villages are isolated from other parts of Turkey during several months of the year.

Within the framework of Southeastern Anatolia Biodiversity Research Project of WWF-Turkey, a survey was conducted to reveal the large mammal presence and distribution in the region (Can & Lise, 2004). Within the framework of the first attempt to collect systematically the large mammal data in Southeastern Turkey. First, a questionnaire was designed and distributed to 450 military posts in the region. The questionnaire included questions about the presence of large mammal species and each questionnaire were accompanied with "Turkey's Mammal Poster" of Turkish Society for the Conservation of Nature (which became WWF-Turkey later). The questionnaires were filled out by military personnel in cooperation with the local people and 428 questionnaires were returned to WWF-Turkey. The questionnaires also included questions related with the historical tiger presence in the region. Later, the questionnaire results were used to identify the areas that the field survey will focus.

In the questionnaire results, some military personal had presented rumors about the presence of large cats in the region. Moreover, during the interviews with local people, the mammal team collected rumors about big cat sightings and met local people that claimed to hear roaring from different sites. In addition, it was reported that there was a local tiger pelt trade in the region and three to five tigers were killed in each year and the pelts were sold to rich land lords in Iraq until mid-1980s. This also confirms Turan (1984) who has obtained his information from local hunters in the region. Baytop (1974) similarly reported that 1-8 tigers were killed each year in Şırnak region.

The Directorate does not have field offices in the region. Therefore, the information on the wildlife of the region has been limited than from the other parts of Turkey. Hunting has never been controlled or documented in the region. Due to the topographical features of the area, the area is very difficult to police even for the military. The communication with the local community has been very limited historically and even today, the flow of information from the region is limited. Mainly due to those factors, the tiger pelt trade had never appeared in the national press although some of the tiger pelts were send to İstanbul until 1969 (Baytop, 1974). The tiger that was killed in Uludere, Şırnak in 1970 appeared in national press since it was a visiting botanist from western Turkey who had photographed and published it. Although, sporadic reports were received of local and military personnel seeing big cats in the region since the mid 1990s, prior to the WWF-Turkey's large mammal study, no survey was conducted by a trained biologist to investigate those sightings in the region.

With special authorization from Turkish Armed Forces, I as the team leader, Yıldırım Lise (Project Coordinator) and Murat Tuna (WWF-Turkey volunteer) visited Uludere, Şırnak and met the local military officers. The military officers in Uludere, Şırnak reported to us that there had been a recent sighting of a big cat in the vicinity. We met the local military officer who had previously reported to his colleagues that by using military type night vision equipment, he had seen a big cat next to a waterhole located at an altitude of 3000 meters. We were interested to travel to that big cat sighting location but due to security and safety reasons, we were informed that this would require certain security and safety arrangements in the field. Since we were authorized to stay only a day in the Uludere, we had to return to Şırnak on the same day.

Nevertheless, new data about the historical presence of tiger was gathered within the survey region. Some of these records were presented in the questionnaires filled by the military personal and the others were reported by the local people to us during the field work. All tiger records from Turkey, including the new historical data collected by Can & Lise (2004) during the Southeastern Anatolia Biodiversity Research Project is presented in Table 1 in the next page .

Considering that, one to eight tigers were killed each year in Eastern Turkey until the mid1980s, the tiger that was killed in Uludere was a young individual according to the stripe patterns, the Caspian tiger is likely to have existed in the region at least until the early 1990s. Nevertheless, due to mainly

lack of interest in addition to security and safety reasons trained biologists had not attempted to survey in Eastern Turkey before.

Realizing that there had been no historical attempts to understand the distribution of Caspian tiger in Turkey and considering the new data on the historical presence of Caspian tiger and recent tiger rumors from the region, a survey proposal for a joint Caspian Tiger Survey in Eastern Turkey had been submitted to US Fish and Wildlife Service Rhinoceros and Tiger Conservation Fund by WWF-Turkey, American Friends of Turkey (AFOT) and American Turkish Council (ATC). Turkish Armed Forces has expressed their interest in the proposed study and now AFOT; ATC and WWF-Turkey have been seeking necessary funds to conduct the survey while waiting the authorization from the Turkish Armed Forces.

Table 1. All known Caspian tiger records from Turkey (from Can & Lise, 2004).

Year	Location	Source & (Type of Record)	Notes
1900-1950s	Between Mardin and Şanlıurfa	Can & Lise (2004)-military, local (sightings)	-
1926-1940	Suçeken, Batman	Can & Lise (2004)-military personnel (sighting by locals)	-
1935-1940	Eruh, Siirt	Can & Lise (2004)-military personnel (sighting by locals)	-
1940s	Viranşehir, Şanlıurfa	Can & Lise (2004)-military personnel (sightings by locals)	-
1940s	Baykan, Siirt	Can & Lise (2004)-military personnel (sightings by locals)	-
1959	Suçeken, Batman	Can & Lise (2004)-questionnaires, military personnel (killed by locals)	-
1960	Viranşehir, Şanlıurfa	Can & Lise (2004)-military personnel (sighting by locals)	-
1960s & 1970s	Şırnak region	Can & Lise (2004) – interview with locals (locals used to organize hunts for tiger)	*
1970	Uludere, Şırnak	Can & Lise (2004)– military personnel (killed by locals)	-
1973	Uludere, Şırnak (then in Hakkari)	Baytop (1974) (tiger skin photographed)	**
1984	Kesmeköprü, Batman	Can & Lise (2004) – interview with locals (killed by locals)	-
2001	Güçlükonak, Şırnak	Can & Lise (2004) – military personal (sighting by locals)	***
2001	Uludere, Şırnak	Can & Lise (2004) – interview with military officer (sighting)	****

Notes: * Locals describe the animals as “leopard-like” but having stripes on both sides’
 ** The only confirmed tiger record from Turkey, the animal was killed in February 1970.
 *** Sighting of an animal reported to the military post.
 **** Animal seen through night vision binoculars, close to a water source, at 3000 meters a. Animal seen through night vision binoculars, close to a water source, at 3000 meters above sea level.

9. CHALLENGES AND PRIORITIES FOR CARNIVORE MANAGEMENT AND CONSERVATION IN TURKEY

9.1. Limiting the Carnivore-Human Conflict:

One of the most serious problems in wolf management is generally the livestock depredation. In Turkey, it occurs sporadically in all of the wolf range where livestock is present and there is no final means of eliminating it. Authorities have kept no records on the damage caused by wolves in Turkey. Nevertheless, the wolf damage to livestock industry in Turkey seems very little. On the other hand, the damage may well be significant to the owner of the livestock who had actually lost some of his animals. Wolf attacks tend to be recurrent

in some localities; solving the problem in those specific areas might be a better option than applying a large scale region wide wolf management program in Turkey. Many European countries pay compensation for the claimed damages. However, only establishing a compensation program are generally far from solving the problem and they must be used with caution in Turkey.

Any compensation program in Turkey should be used in conjunction with more efficient prevention measures. The native dog breeds of Kangal and Akbaş have been used for livestock guarding in some parts of Turkey. Although there have been no study documenting the effectiveness of those dogs in limiting wolf damage, the local people consider those particular breed dogs efficient in livestock guarding. WWF-Turkey recently started investigating the effectiveness of Sivas Kangal dogs in limiting wolf damage in Central Turkey (Can, 2004b). If this study shows that Kangal dogs are effective against wolves, the use of such dog breeds should be promoted by the Directorate and the Ministry of Agriculture and Rural Affairs. If necessary, the Directorate can cooperate with the Ministry of Agriculture and Rural Affairs to establish a breeding program for those dogs so that Kangal pups can be provided to local communities in problem areas.

The local people have been complaining the damage caused by bears to beehives in Northeastern Turkey. The issue has been even discussed several times in the last years at the Turkish Parliament. The local people also gets organized and send letters to the Directorate, reach politicians from every level and make pressure on national and local authorities to eradicate brown bears in some areas. Some local communities have created effective ways to limit the bear damage by placing the beehives up on the trees and covering the trunk by metal sheets to stop the bear climbing the tree. Another indigenous way of limiting the bear damage is placing the beehives in the cracks of steep rock walls. However, when the whole Northeastern Turkey is considered, it is evident that the local people are reluctant to try such indigenous methods or traditional methods such use of fence or electrical fence, placing beehives in platforms etc. The villages and human settlements are virtually everywhere in the forest and the beehives are sometimes placed in the best brown bear habitat without any protection. The local people should be encouraged to take some of their responsibility in protecting their orchards and beehives from which they earn their living. It must be noted here that habitats rich in wild trees are important in terms of bear food but they have been degraded by the local people. Since such trees have little wood value, the General Directorate of Forestry personnel generally has not enforced the relevant laws (anonymous General Directorate of Forestry personnel, personal communication, Ankara, 2004). The Directorate can consider cooperating with the General Directorate of Forestry to establish a restoration program in selected bear habitats. The Directorate administrators should encourage their staff to record damage caused by large carnivores that will provide us a better understanding of the extent of the problem.

9.2. Protecting the Habitats, Protected Areas and Carnivores:

Forests constitute approximately 20.7 million ha in Turkey (26.8% of the country). Of these forests, 10.5 million ha (51%) are considered to be productive, whereas the remaining 10.2 million ha of forests are unproductive or degraded due to excessive exploitation. Presently, 49% of Turkish forests are heavily degraded (Kaya and Raynal 2001). Undisturbed forests are about 2.5% of the total forest area, and some of these forests exist outside protected areas (Kalem 2000). Large carnivore populations in Turkey are most likely negatively affected by large-scale forest fragmentation and degradation that has occurred during the last 50 years.

Habitat degradation is largely a result of human dependency on forests for fuel wood, extraction of other forest products, and extensive livestock grazing. However, the former large-scale clear cutting system has recently been changed to narrow and small-scale shelter-wood systems (Muthoo 1997).

Unsustainable forestry practices and unsustainable development in some areas have largely affected carnivores and their prey base.

Turkey's human population has increased from 13 million in the 1920s to approximately 62 million in 1997. This has put tremendous pressure on land, water resources, and the environment. The combined effects of rapid urbanization and industrialization and associated economic activities have resulted use of natural resources above sustainable levels. About 99% of the forests in Turkey are owned by the state and nearly 150,000 km of forest roads have been constructed since 1974, with a further 4,000 km planned for each year until 2010 (Muthoo 1997).

Nevertheless, in some areas such as the Küre Mountains in Kastamonu, the human migration rate to larger towns and cities is high and there is more space available for brown bears than 20 years ago. The same applies to many areas in eastern Turkey, where people have moved to larger towns to find better jobs and living conditions.

According to the Central Hunting Commission, Forest Law (No: 6831), National Park Law (No:2873) hunting is forbidden in national parks, nature reserves, nature parks, protection forests, and wildlife protection areas. Therefore, large carnivores in those areas have additional protection. About 3.6 million ha of land that has been set aside for conservation provide direct and indirect protection to large carnivores and brown bears in Turkey (Table 2).

Table 2. Number and size of conservation areas in Turkey which may provide habitat for large carnivores, 2004.

Protected Area Type	Responsible Organization	Numbers	Total Area (ha)	% Area of country
National Parks	MoEF ^a	34	710,131	0.91
Nature Reserves	MoEF ^a	35	83,023	0.1
Nature Parks	MoEF ^a	17	69,505	0.09
Wildlife Protection Area	MoEF ^a	107	1,614,899	2.07
Protection Forests	MoEF ^a	53	365,884	0.47
Total			2,843,442	3.64

On the other hand, it must be noted that the protected areas in Turkey are usually small to provide safe habitat for large carnivores. For example, 80% of the national parks with brown bear populations are 500 km². (Can & Togan, 2004). Probably the main problem with the protected areas in Turkey is as follows: We do not know well what those protected areas protect. In many protected areas, the protected area personnel are unaware of presence of some species. Field surveys and monitoring systems are practically non-existent for large carnivores as well as other large mammals in Turkey. The challenge in Turkey is not where to protect but how to protect and manage those areas in Turkey. Current forest management plans do not consider the presence of brown bears and other wildlife species; therefore, the effects of forestry practices on wildlife need to be evaluated and forest management plans revised accordingly. The Directorate should evaluate the current road and dam plans of the State Water Works (DSİ), the Ministry of Energy, and the Ministry of Transportation in eastern Turkey.

9.3. Promoting Carnivore Research in Turkey:

Among the Turkish researchers, there has been a growing interest on small mammals but the same is not true for the large mammals (Kurtonur, 1996). The first information on the mammals inhabiting Turkey is found in the book of Usáma ibn Munkiz (1096-1188) and for the next seven centuries only incidental observations by various travelers are available (Kryštufek & Vohralík, 2001). C. G. Danford explored southern Turkey, northwestern Turkey and Central Turkey in 1875 and 1876 and as probably one of the first Turkish scientists, A. Vehbi reported on the biology of wild goat in Turkey in 1931 (Kumerloeve, 1986). Savni Huş published a book in 1974 on game animals which became a major reference book in the forest engineering departments. However, H. Kumerloeve, German ornithologist made the most contribution to understanding the large mammal presence and distribution in Turkey. He had published several articles on the presence of mammals and compiled a bibliography of mammals and birds (Kumerloeve, 1986). Nihat Turan (1984) compiled a handbook on the mammals of Turkey and presented distribution maps for some species. Ali Demirsoy (1996) compiled a book on the mammals of Turkey.

Although the research on mammal fauna has increased during the last 10 years, the research on large mammals is still limited in Turkey (Kurtonur, 1996). The studies of Kaya (1991) on Anatolian wild sheep, Oğurlu (1997) on red deer, Başkaya and Terzioğlu (1998) on chamois, Can (2000) on wolf, Can (2003) on striped hyena and Can and Togan (2004) on brown bear are first practical attempts in the field to study large mammals in Turkey.

The wildlife is ignored as a natural resource in Turkey and the majority of the general public including the academicians working in life sciences are generally unaware of the presence of even some large mammals in Turkey (Can, 2001b). It is not surprising that, wildlife is a low profile issue in Turkey without the relevant education and training in biology departments in universities. In Turkey, for the birds and reptiles, there has been a growing interest by both foreign and local biologists but still little is known about large mammals. Today, the information gap on mammal populations in Turkey is an obstacle for effective conservation in Turkey. Some limited research has been conducted on several large herbivores but these works contributed very little, if any to conservation on the ground (National Report on Sustainable Development, 2002). There is no Ph.D. holding researcher or lecturer on carnivores in nearly 80 of the universities in Turkey. It is evident that the current efforts spend in universities for large mammal research have very little affect, if any on the ground. Fortunately the cooperation between different universities and between universities and Directorate is improving during the recent years. The current programs in biology in Turkey are insufficient to train the future field biologists that will affect the conservation on the ground. Forestry faculties have been historically interested in wildlife research but their efforts have been also limited. According to the Directorate, universities fail to provide the necessary expertise that can contribute large mammal management and conservation efforts of the Directorate. (Mustafa Akıncıoğlu, Deputy Director, Ankara, Turkey, personal communication, 2004)

It must be noted there are 4 biology departments in 4 universities located in Ankara where the Central Hunting Commission meetings takes place annually. Although the academicians can participate in the open session of the Central Hunting Commission to express their opinions and to present their relevant research to influence the Commission decision that affects the faith of Turkey's wildlife and nature, they are generally reluctant to bother with the Directorate personnel and hunters. As a result, decisions on wildlife management and conservation have been normally left to only national and local authorities that have been historically under the influence of the hunting lobby in Turkey.

9.4. Achieving Sustainable Hunting:

Wildlife is a valuable resource and it may be utilized in a sustainable way by carefully planned tourism, which will include trekking, fishing, bird watching, wildlife observation, nature photography etc. However, in Turkey wildlife is only considered for its value in consumptive use and in addition it is not properly maintained. With few exceptions all large mammals have been declining in Turkey since 1950s. One of the main reasons for that is obviously the depletion of wildlife species by excessive hunting (Swift & Holloway, 1967; Turan, 1984; Kence & Tarhan, 1997; Can 2001).

There are officially about 2.5 million hunters in Turkey. One needs to be at least 18 years old and possess a license to hunt. Recently, the Ministry of Education and the Ministry of Environment and Forestry started a joint education program for those who want to become a hunter. New hunting licenses are issued after successful completion of the training program. However, this might increase the number of people that hunt without any license since some of the hunters find the training period discouraging and prefer to hunt without a license. During the WWF-Turkey South Eastern Anatolia Biodiversity Research Project in 2001-2003, it was noted none of the hunters whom the project team met, had hunting licenses in Southeastern Turkey.

There are about 8 million forest villagers living in 17,797 forest villages in Turkey (National Report on Sustainable Development, 2002). Considering that most of the men in the villages have guns, the actual number of people that hunt in Turkey, will be a much higher than the number of official hunters in Turkey. Considering the size of Turkey and limited resources of the Directorate,

It is a real challenge to control the hunting activities in Turkey. One way to tackle this problem is to create an effective mechanism in which hunters control themselves. In fact, Directorate is trying a system called "volunteer hunting inspectors" which is about establishing a self control within the hunting community but there are some current shortcomings for this application.

Another option is to consider the General Command of Gendarmerie in controlling the hunting activities in Turkey. The gendarmerie is responsible for 91% of Turkey's land and posts virtually cover all parts of Turkey; the gendarmerie forces are well trained, they live in the posts and they are on the ground during the whole year. In fact, General Command of Gendarmerie realized the limited efforts for the protection of the natural resources and established "Gendarmerie Environment Teams" in 17 provinces, and there are ongoing efforts to establish those teams in other 53 provinces. The environment teams monitor and control the use of natural resources including the hunting activities. The Directorate may still run the hunter training courses and distribute hunting licenses but the control of hunting activities can be done by the gendarmerie in Turkey.

9.5. Legal, Institutional Structures and Carnivores:

The Constitution, various laws, regulations and international conventions regarding nature conservation, make up the legal framework for the conservation of biodiversity in Turkey (National Report on Sustainable Development, 2002). The general approach in Turkish legislation is to protect natural resources without specific reference to sustainability (National Report on Sustainable Development, 2002). Lack of such legislation particularly affects *in situ* conservation of large areas of important biodiversity outside of protected areas. Terrestrial Hunting Law of 2003 is the principal law related with wildlife protection, management and conservation in Turkey.

General Directorate of Nature Protection and National Parks consists of 3 Deputy Directorates under which sub-units are found. Within the Directorate, one Deputy Directorate is responsible for issues related with wildlife and carnivores. This means that wildlife protection, management and conservation are dealt at the deputy directorate level. This brings staff, budget, bureaucratic and some other limitations to wildlife protection, management and conservation activities. There is an urgent need to reconsider the organization structure of the Directorate. The level at which wildlife protection, management and conservation is dealt should be at General Directorate level. This means that the Deputy Directorate related with wildlife should be a separate General Directorate under the Ministry of Environment and Forestry.

International conventions are superimposed on the existing situation without making the necessary adjustments in legislation and the fact that national legislation has not been adequately adjusted in line with the international conventions also causes conflicts in implementation (National Report on Sustainable Development, 2002). Inadequate harmonization of national legislation with international laws and conventions sometimes create conflicts because supporting implementation regulations are lacking.

Turkey has taken concrete steps for the conservation of biodiversity. Turkey, participated in the Pan-European Process on Protection of the Forests and ensured national coordination of Strasbourg, Helsinki and Lisbon decisions, signed the Convention of Biological Diversity in 1992 and ratified it in 1996. The European Landscape Convention and Cartagena Protocol on Biosafety were signed. Turkey

became a Party to Convention to Combat Desertification, Ramsar Convention, Convention on the Protection of the Black Sea against Pollution and to Basel Convention on the Control of the Transborder Movements of Hazardous Waste and Their Disposal. Turkey is a member of the Bern Convention, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) all of which are relevant to carnivores. However, there is neither a management plan nor a monitoring program for any of the carnivores in Turkey. Although Turkey has numerous laws, regulations, and programs that favor conservation, implementation of these guidelines requires increased commitment and vigilance (Kaya and Raynal 2001).

9.6. Public Awareness and Nature Education:

Environmental education activities are predominantly conducted by the non governmental organizations. The non governmental organizations emphasize environmental education and the conservation of biodiversity in general (National Report on Sustainable Development, 2002). The number of such organizations has increased during the last years but they conduct projects particularly with international financing and the current capacity of non governmental organizations working on environmental education is limited in project development, project implementation and assessment of success (National Report on Sustainable Development, 2002). There have been no programs for public awareness or education related with mammals. WWF-Turkey modestly produced and distributed nearly 50,000 posters of “Anatolian leopard” and “Mammals of Turkey” in Turkey as the first public education materials on carnivores in Turkey. World Society for the Protection of Animals (WSPA) and WWF Turkey is working on an education program on brown bears in Turkey which may strengthen the environmental conscience of the public and may stimulate the local authorities to show interest in not only bear research and management but also carnivore conservation.

10. RECOMMENDED ACTIONS FOR EFFECTIVE CARNIVORE CONSERVATION AND MANAGEMENT IN TURKEY

The overall goal of the proposed actions is “to maintain and restore, where possible, in coexistence with people, viable populations of wolf, brown bear, lynx, striped hyaena and other carnivores as an integral part of ecosystems and landscapes in Turkey”.

Objectives to reach this goal were defined as:

1. To conserve the present viable large carnivore populations in Turkey, and allow especially striped hyaena and lynx to expand into suitable habitat, thereby increasing their population numbers and range to the limit that can be sustained given socio-economic realities.
2. To secure the viability of brown bear and presently small isolated striped hyaena and lynx populations by increasing their population number and range.
3. To reduce the conflict between large carnivores and humans and promote activities those secure a positive public attitude towards large carnivores to realize the other two objectives above.

List of Actions

1. Re-structure the General Directorate of Nature Protection and National Parks and establish the General Directorate for Wildlife as a separate directorate under the Ministry of Environment and Forestry.
2. Re-structure the Central Hunting Commission so that the number of members from hunting groups and universities, nature conservation organizations should be at least equal. This may require that the law is changed or there can be another intermediate step such as another commission can be established and the Central Hunting Commission may follow the commission’s decisions.
3. Turkey should establish a specific single body that is responsible for large carnivore management and conservation issues. A Group of Experts on Mammals of Turkey should be established and the responsibility and the group must be supported by the relevant legislation.
4. Review the hunting regulations including areas, quota seasons and methods.

5. The current strong and credible fines for poaching of brown bear, lynx and hyaena should be strictly enforced on the ground.
6. Review the current legislation and explore the possibility of establishing compensation schemes for damage caused by striped hyaena, lynx and brown bear to livestock and farm animals in order to limit and where possible avoid conflict. Wherever compensation systems are in place, these should be tied to prevention incentives. If necessary, make relevant legislation arrangements to accomplish this.
7. Develop where appropriate bilateral or multilateral contacts with other countries for scientific and conservation purposes. For trans-border management of large carnivores and their prey, coordinate research and projects between neighboring countries such as Georgia, Syria and Iran.
8. Prepare the "Large Carnivore Action Plan for Turkey" and submit the Plan to be discussed and formally approved by the Bern Convention.
9. Review the WWF Caucasus Biodiversity Conservation Action Plan from the point of large carnivores and their prey. Recommend the necessary additions to WWF.
10. Review the National Biodiversity Strategy and Action Plan and National Report on Sustainable Development 2002 from the point of view of large carnivores and their prey, habitat. Submit the result of this review to the relevant government bodies and universities. Promote and monitor the strict implementation of the National Biodiversity Strategy and Action Plan.
11. Coordinate scientific research on large carnivores in Turkey and maintain a close link with researchers working elsewhere in the world.
12. Encourage research on all the aspects of the biology and ecology of the large carnivores, carry out in particular: Population size, biological characteristics, distribution, genetic studies, predator-prey relationship, habitat use, human-carnivore conflict, conflict resolution, and impact of hunters on prey populations. Make the results known to public.
13. Coordinate the regular gathering of all necessary data to monitor the management, conservation and biological conditions of large carnivores, their habitat and prey in Turkey.
14. Evaluate the status of the habitat and food supply for the large carnivores in various regions and identify the needs for specific actions (reintroductions, managing hunting seasons and quotas, artificial feeding, habitat restoration).
15. Status survey for wolf, brown bear and lynx is urgently needed in eastern Turkey along the route of the Baku-Tbilisi-Ceyhan crude oil pipeline project.
16. Assess the genetic identity of local wolves in view of assessing/preventing wolf/dog hybridization.
17. Classify areas within present and potential large carnivore range according to their suitability and importance as large carnivore habitat. Consider large scale areas where viable large carnivores are present with potential wild prey. Identify also the areas where wild prey populations are not anymore present, but could be re-established. This process should follow a standard methodology and a set of criteria can be defined for such "Large Carnivore Landscapes-LCLs". The criteria may include: Minimum size of the area, its isolation and connection with other areas, the level of conflict with human activities, the diversity and total number of prey populations etc. Through this process, large carnivore recovery and management will be linked to the overall planning for the restoration of Turkey's ecosystems.
18. Consider the LCLs and evaluate the impact of existing and planned infrastructure within the large carnivore range, mitigate potentially negative impacts where necessary.
19. Carefully control or prohibit human activities proven or suspected to be detrimental to lynx, brown bears, striped hyaena in the LCLs and linkage zones
20. Assess the quality of hunting in its biological and social perspectives in the selected LCLs.

21. Investigate the connectivity of striped hyaena, brown bear and lynx subpopulations and reveal the effectiveness of current protected area network in carnivore conservation, identify the regions where there are needs for habitat corridors.
22. Enforce the Terrestrial Hunting Law and relevant legislation in Eastern Turkey and Southeastern Turkey. Investigate the possibility of General Command of Gendarmerie's taking over the full responsibility of hunting control in Turkey.
23. Establish, train, and support a carnivore damage prevention team. Special fieldwork allowances should also be arranged to encourage the team members. The carnivore damage prevention team should work to limit large carnivore –human conflicts and should consider and implement management alternatives such as removal, translocation, aversive conditioning and removal of problem individuals depending on the severity and circumstances of the situation.
24. Establish compensation programs with built-in measures to minimize cheating for lynx, brown bear and striped hyaena in the LCLs. Consider a compensation program after having several years of experience in the implementation of the previous one established for lynx, brown bear and striped hyaena.
25. Link these compensation programs to the individual farmer's use of preventive measures. Thus, compensation has to be linked with prevention (electric fences, night enclosures, livestock guarding dogs, etc.) The prices paid as compensation should be equal for damage done by different predators living in the area. Identifying the predator that is responsible is very important. Train the game-wardens where the compensation system is established in identifying lynx kills.
26. A program of livestock guarding dogs' promotion should be undertaken including: An specific program (involving for example a newsletter for farmers) on the use of livestock guarding dogs (highlight the difference with herding dogs). Create a national network and exchange information on livestock guarding dogs, which is especially needed in areas where this technique has been lost.
27. Establish a research program in order to make the use of livestock guarding dogs such as Akbaş, Kangal more efficient.
28. Remove problem wolves and bears in viable populations if preventive efforts have failed. Carry out (for the population in short and long term) – benefit (for the society and the carnivore population in the long term) analysis before considering removal of problem wolves and carnivores in threatened populations. For wolf and brown bear with regard to identified "problem" animals, which create local damage, emphasis should be given to maintaining populations and not by concentrating on individuals (apart from rare exceptions). There is a need to concentrate conservation efforts at the population level.
29. Where re-colonization of areas by lynx and striped hyaena large carnivores is desirable, the following principles should be applied: priority should be to firstly support natural re-colonization, secondly to work on the augmentation on non-viable populations, thirdly to release animals into areas in order to join up non-viable populations.
30. Strengthen the enforcement of legislation related with anti-poaching of striped hyaena, lynx and brown bear by poisoning, shooting etc.
31. Consider the possibility of carrying out captive breeding and reintroduction programmes for striped hyaena in Southeast Turkey; carry out the necessary genetic studies in order to avoid possible negative effects of introducing individuals from genetically different stocks.
32. Assess the problem of feral and stray dogs in LCLs and the efficiency of existing legislation to control them. Where necessary, prepare a plan to control them.
33. Identify opinion leaders and stakeholders in large carnivore management and conservation; set up local boards and involve them in the process. Consider the needs of local people.

34. Identify the need of an educational program on large carnivores at local or national level. Design and implement the relevant education project.
35. Design and implement awareness campaigns, aimed at the rural populations in LCLs and to the game-wardens, hunters, school children and local decision-makers. An information campaign may cover several aspects, including: Carnivore ecology, damage to livestock and how to limit damages, human safety, waste management (applies to wolf, brown bear and lynx). Identify and empower credible carnivore managers to present the case of the carnivores in front of the public and the press.
36. Translate the key documents of Council of Europe such as Drafting and Implementing Action Plans for Threatened Species (1998) related with large carnivores into Turkish; distribute them to relevant government authorities. Provide sample copies to the main libraries in Turkey.
37. During the implementation of all actions, actively work with Large Carnivore Initiative for Europe and relevant IUCN Species Specialist Groups.

11. CONCLUSION

Challenge of conserving large carnivores is complex and dynamic, involving ecological, economic, institutional, political and cultural factors and although no single agency, organization and single plan or strategy can be completely comprehensive and correct as a guide (Boitani, 2001). The problem facing Turkey in conservation of large carnivores is multifaceted. There have been technical, personnel, institutional, and political limitations for designing effective conservation programs for carnivores. The current capacity of national authorities is limited. The national wildlife leadership in government in all levels rests on few people. The current contribution of universities to carnivore conservation and management is very limited. The majority of public has shown no resentment at the destruction of this natural resource because the facts have never been explained to them (Swift & Holloway, 1967).

Today, Turkish people recognize the need to maintain a healthy environment and are concerned about the degradation of ecosystems and loss of species that result from human activities. As an indicator to this, National Biodiversity Strategy and Action Plan lists the following priorities: Establishment of wildlife protection areas, captive breeding programs; providing training for government staff and stakeholders on related topics; developing public awareness programs; providing education to communities on sustainable use of natural resources.

Turkey has some advantages: The natural habitats are larger compared to the other countries in Europe and unlike in Europe, the same legislations are effective and same language is spoken throughout the carnivore range. Turkey is currently a candidate country for European Union membership and it is expected that more funds will be available for nature conservation. If conservation donors consider the wildlife management and conservation -a totally neglected issue before- as a top priority and nothing short of top level attention of Turkish Government is attracted to the issue, we can change the current trend in hyaena, lynx, brown bear, and wolf populations as well as in the prey populations. The final efforts must be spend to reveal the presence of last individuals of leopard and Caspian tiger although there seems to be no viable populations. In fact, this is a historical mission that should have been completed in the late 1980s. These efforts may at least attract Turkish Nation's interest to carnivores and wildlife.

Large carnivores such as wolf, brown bear and lynx need large areas of relatively wild habitat and these species play important ecological roles and the effects of carnivores in community structure and diversity can be great (Noss, et. al., 1996). They serve as protective umbrella species for other wildlife species since their habitat area requirements encompass the habitats of many other species and conservation of such areas that support populations of large carnivores are likely to include many other species and natural communities (Noss, et. al., 1996; Machado, 1997; Boitani, 2001). Therefore, conservation and sound management of wolf, brown bear, lynx and hyaena will also contribute to the conservation of Turkey's nature.

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