

Assessment of the Persian Leopard Mortality Rate in Iran

Arezoo Sanei^{1,2}, Marzieh Mousavi³, Maryam Mousivand⁴, Moahamed Zakaria¹

¹Wildlife Research Unit, Department of Forest Management, Universiti Putra Malaysia

²Asian Leopard Specialist Society, Terhan, Iran.

³Department of Environment of Iran, Terhan.

⁴DoE provincial office, Lorestan, Iran

Corresponding author's e-mail: arezoo.sanei@leopardspecialists.com, arezoo.sanei@gmail.com

Abstract

Persian leopard (*Panthera pardus saxicolor*) mortalities were recorded in 31 provinces of Iran while a national survey was undertaken to assess current status of the leopard in the country. Questionnaires were frequently sent out to the provincial offices of the Department of Environment in each province from 2007 to 2011. Interviews with hunters and local knowledgeable people were done to investigate hunted and poisoned leopard individuals. We recorded a total of 71 leopard mortalities across the country while 70% of them ($n=50$) were as a result of intentional poisoning and hunting of the specimens. Furthermore, 13 cases of road kills were recorded which most of them were taken place in Golestan province, Northern Iran. Mortalities as a result of human factors, direct shooting and poisoning of the species had a high rate of 9 individuals in Lorestan province in the recent years. In the meantime, habitat destructions and lack of prey sufficiency in various parts of leopard distribution range in the country resulted in increasing rate of human-leopard conflicts in the recent times. Enforcement of compensation programs to recoup for actual losses inflicted by leopards, informing local villagers and shepherds about this program and increasing amount of the fines for illegal hunting of leopards and their preys (i.e. wild goat *Capra aegagrus* and wild sheep *Ovis orientalis*) may effectively reduce revenge killings. Since majority of the Persian leopard population in the Middle East inhabits in Iran which also supports species viability in the neighbouring countries, implementing research-based and prioritized conservation programs to protect the species in its current range in the country is essential.

Keywords: Persian leopard, Iran, mortality rate, illegal hunting, road kills.

Introduction

Once, Persian leopard (*Panthera pardus saxicolor*) was distributed over a wide range in the Middle East from Russia, Georgia, Azerbaijan, Armenia, Turkey and Iraq eastwards through a vast areas in Iran to Turkmenistan, Kazakhstan, Uzbekistan, Tajikistan, Afghanistan and Pakistan [1, 2, 3, 4, 5, 6, 7, 8]. However, in the mid of 20th century it has extinct in some regions [9]. Rapid losses of Persian leopard populations in some parts of its range in the recent decades have attracted attention of conservationists to the status of this sub-species in its natural habitats in the region.

Iran is known to be the last stronghold for the Persian leopards in the Middle East as in 2002 it was estimated that 550-850 individuals inhabited over the range of 885,300 km² [10]. However, the total number of specimens in the Middle East is thought to be no more than 1300 individuals [11]. A comparison between leopard distribution range in Iran plotted for the years earlier than 2006 [12, 13] with its recent distribution pattern assessed in 2011 suggests that leopard population in Iran is splitting to two Northern and Southern fragmented parts [Sanei *et al.* in press].

The principal threats to the Persian leopards are poaching, habitat destruction through logging, burning, agricultural use and land use changes, mining, road construction as well as prey reduction [12, 14, 15]. Previous study identified and ranked several threat factors affecting leopard survival in Iran based on the frequency of their existence across the identified leopard range in the country [16]. Data collection in this study commenced from the years earlier than 2006. These factors which could affect the survival of leopards in Iran include: (1) habitat destruction, (2) illegal hunting, (3) drought and dry condition, (4) presence of animal husbandries in the habitats, (5) lack of conservation facilities, (6) low environmental awareness and (7) impacts of war in the Western parts of the country. More recently, dry condition is posing a serious threat to the leopard potential preys particularly in Southern and Eastern parts of the country. Among all these factors, habitat loss and

degradation greatly threaten viability of this territorial species in the region. Previous studies on edge effects on conservation of leopards in Phinda-Mkhuze complex in South Africa reveal that leopards near the borders of protected areas spent much of their time outside the protected area where risk of mortality increases and anthropogenic mortality is common [17, 18]. In isolated and fragmented habitats, leopard populations face great risk as a result of environmental variation, demographic stochastic and reduced genetic diversity [19].

Anthropogenic leopard mortalities in Iran appear to have increased in the recent times. Current study was conducted as a part of a national survey on the Persian leopard status in Iran in order to identify reasons underlying leopard mortalities in the country.

Material and Methods

A total of 190 questionnaires were filled by 31 provincial offices of the Department of Environment from 2007 to 2011 to record all kinds of leopard detections including direct observations, indirect signs (e.g. footprints, feces, remains of hunted preys), complaints of local communities regarding livestock-leopard conflicts, sick individuals and leopard mortality cases, mortality causes and their localities. Whenever possible, dead or immobilized individuals were measured and samples were collected for further genetic studies. We conducted interviews with hunters and local knowledgeable persons to investigate hunted, trapped and poisoned individuals.

Results and Discussions

We found a total of 71 leopard mortalities from 2007 to 2011 in 18 provinces out of 31 provinces in Iran (Figure 1). Among these records, Golestan province had the highest rate (n=16) of leopard mortality represented by 22.5% of the mortalities in which 12 leopards were hunted, three were killed in road accidents while only one leopard died naturally. Subsequently, Lorestan province recorded 12.5% of total leopard mortalities (n=9) while Fars province had nearly 10% of the leopard mortalities (n=7). They were the provinces with the highest number of leopard mortalities after Golestan province. The main causes of leopard mortalities were recorded to be hunting and poisoning which accounted for 70% of the total mortalities in leopards while road accidents had 18% of the mortality rate in leopards. Only few leopards were recorded to die naturally (n=1) or as a result of disease (n=3), flood (n=1) and intra-specific conflicts (n=1). However, reasons underlying 2 cases of leopard mortalities could not be identified.

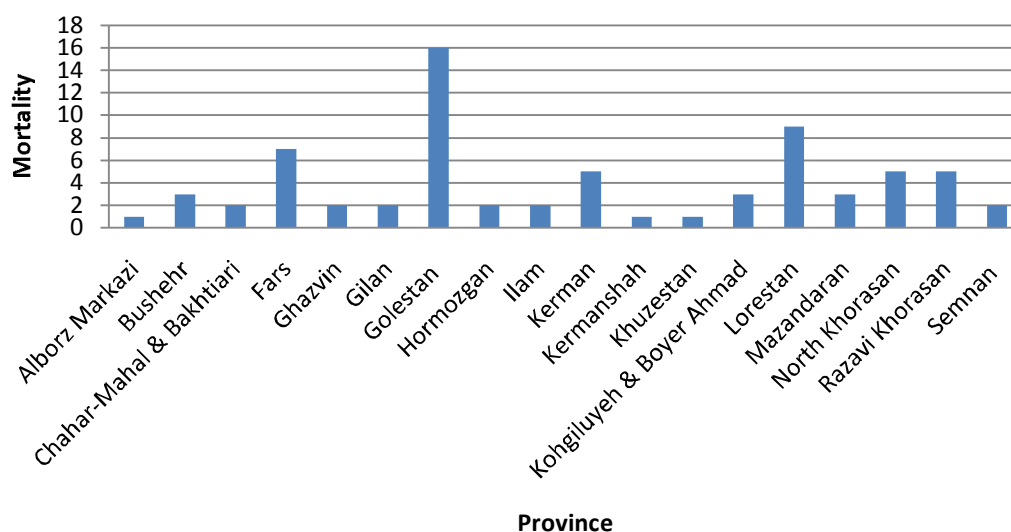


Figure 1: Persian leopard mortalities recorded from 2007-2011 in a total of 18 provinces of Iran.

A total of 42 cases of leopard mortalities have been recorded in Golestan province by Golestan DoE provincial office within 25 years (1984 to 2009). The gender of the 28 leopards was categorized into 9 females and 19 males. It was shown in Figure 2 that the leopards' mortality rate in 2009 increased

to 29% of all the recorded cases of leopards' death within 25 years (1984-2009) in this province. From a total of 12 mortalities in 2009, 9 of them were hunted while 3 of them died in the road crash (Figure 2). One of the serious life-threatening issues to either the leopards or other native wildlife species of the region such as red deer in Golestan NP is road accidents. Wildlife accidents in Golestan province could be significantly reduced by construction of underpasses at certain spots along the road passing through Golestan NP.

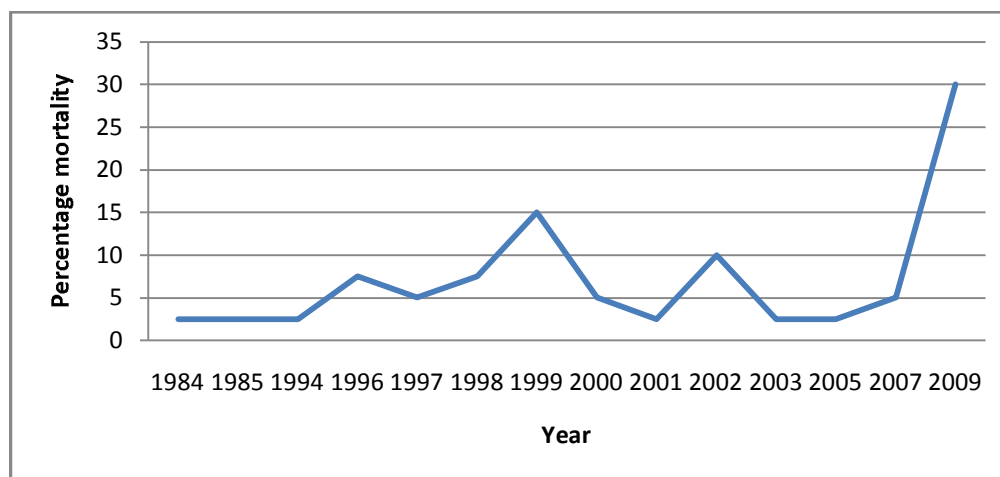


Figure 2: Cases of leopard mortality recorded in Golestan province from 1984 to 2009 (Source of data: Golestan provincial office of the Department of Environment)

From the total of 9 leopard mortalities reported in Lorestan province, 7 of the leopards were hunted while 2 of them were poisoned. However, only 1 of the leopards was immature while the rest were adult leopards. The total of 22 leopards which died between 2007 and 2011 comprised 12 males and 10 females. Recently, three more cases of leopard mortalities were recorded as Sabzevar in Razavi Khorasan province, Shahroud in Semnan province and Siahkal in Gilan province produced one case each in 2012 whereas the first one was a female with cubs as it was reported by local villagers. Meanwhile, no information about the cubs after hunting of their mother is available. Furthermore, an immature leopard was trapped in a snare that was set up by local people to catch porcupines that raid their crop fields. The leopard was subsequently relocated to Tehran DoE but it lost a front hand after surgery.

Leopard is considered as a protected species in the Iranian national wildlife conservation law enacted since 1999. Therefore, we assume that the total number of mortalities and particularly those which were intentionally hunted or poisoned could be more than what we found and subsequently reported in this research. However, mortalities mentioned in this research could be used as a minimum rate for leopard mortalities in the mentioned provinces. Since the total population of Persian leopards in Iran was estimated at 550-850 leopards in 2002 [10], 71 cases of mortality recorded within only 4 years could be considered as a high rate.

In general, leopards are vulnerable to local extinction in fragmented habitats because of anthropogenic activities and requirements of large ranges [20, 21]. Earlier studies revealed that habitat disturbance and degradation as well as illegal hunting were considered as the main factors threatening leopard survival in Iran [14]. As a case in point, studies reported that habitat loss and fragmentation in Bamu NP in Southern Iran are the main threats to the leopards in this area [21, 22]. Furthermore, drought and intensive dry condition with desiccated springs and water resources as well as areas with significant decrease in their normal rainfall trend pose life-threats to the leopards and their main preys in their habitats in the recent years [13]. In 2008, an immature leopard was found to be starved to death in Kazeroun Township, Fars province in Southern Iran. The reports from DoE on different provinces of Iran testified that drought has led to mortality of ungulates or their distant migrations to other areas. Alarmingly, drought-affected ungulates, especially wild sheep and wild goats, raid crop fields and gardens and provoke conflicts with humans. These conflicts entailed frequent complaints by villagers to DoE officials and may also lead to poaching of intruding animals. Unlike their prey, leopards are strictly territorial and cannot move far away from their home ranges to

escape from aridisation. Young inexperienced leopard individuals may die from hunger and thirst or try to prey on any available small animals (reptiles, rodents) or livestock to survive. Desperate attacks on domestic livestock engender conflicts and retaliatory killings by local herders. Establishing waterholes especially in the habitats where the springs has been dried out is a common and traditional conservation approach to save wildlife species from unsuitable climate conditions.

Establishment of waterholes inside protected areas would significantly decrease the possibility of poaching from hideouts near the waterholes because the waterhole sites will be patrolled by local rangers on a daily basis and the chances of poaching will be kept low.

Rapid developments, habitat fragmentations and lack of prey sufficiency bring about livestock-leopard conflicts. Previous studies revealed that there were several hot spots for human/livestock-leopard conflicts [see also 16; Sanei *et al.*, in press]. Enforcement of compensation programs in these areas could significantly reduce revenge killings of leopards by local communities.

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