



The Persian Leopard: Ecology and Conservation in Northeastern Iran

Annual Report 2013

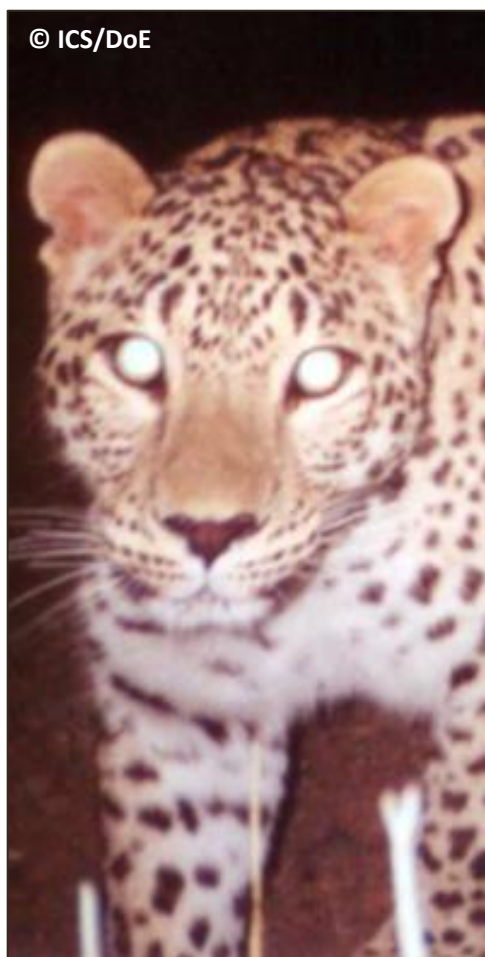
WILDCRU 
Wildlife Conservation Research Unit

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Introduction

The leopard (*Panthera pardus*) is one of the most widely distributed terrestrial carnivores, with a global range of at least 80 countries across a range of habitats from rainforests to deserts. After the disappearance in the 1960s of both the Asiatic lion (*Panthera leo persica*) and the Caspian tiger (*Panthera tigris virgata*), the Persian leopard (*Panthera pardus saxicolor*) is the largest extant cat in western and central Asia, and categorized as “endangered” by the IUCN (IUCN 2008).



The largest Persian leopard population outside of Iran is thought to exist in Afghanistan and Turkmenistan in central Asia, where there may be as few as 200 and 80 individuals respectively. Meanwhile, the main stronghold of the leopard in the Middle East is in Iran with a crude national population estimate of 550 to 850 animals. This comprises some 65% of the guesstimated total number of mature individuals of this subspecies. The Iranian population is thought to support the viability of the small leopard subpopulations in the Caucasus, and, possibly, in Turkmenistan through trans-boundary emigrations.

Since 2006 the Iranian Cheetah Society (ICS) has led efforts to understand the ecology of Persian Leopards in the region. This work shaped the basis for the present project which was established in mid-2013 in the University of Oxford's Wildlife Conservation Research Unit (WildCRU). Its goal is to conserve the endangered Persian leopard within multiple reserves in northeastern Iran, by producing both cutting-edge science and the expertise and training which is necessary for effective conservation.

We are exploring some hitherto unknown aspects of its ecology such as ranging behavior. We are particularly interested in understanding the value of parks and their boundaries in protecting the populations. We are also investigating how local communities' interact with the reserves. We are promoting their involvement with some sites by enhancing their knowledge and developing their capacity for conservation practice. Collaborative monitoring and the sharing of research findings are part of this process. The project's diverse components are aimed at ensuring the long-term survival of the Persian Leopard within multiple reserves in north-eastern Iran. The present document outlines activities undertaken during 2013.

Project Objectives

a) Human-dimension

1. Evaluation of the local people's attitude toward the leopard and assessment possible conflict with the leopard;

Activities: Designing questionnaire, training local students, interviewing households, analysis and determination of high conflict communities.

2. Community-based educational outreach programs to enhance their knowledge;

Activities: Designing proper drama, training team and implementation in communities within high priority areas (to be recommended by questionnaire surveys results).

3. Regional and national public awareness through mass media;

Activities: Finding media links and sharing news and events with them.

4. Production a documentary film about the leopard and project activities;

b) Biological surveys

1. Establishing a large-scale baseline survey of the spatial distribution of the Persian leopard and its main prey species (i.e. urial sheep and Persian ibex) within main reserves in NE Iran;

Activities: Establishing monitoring plan based on occupancy modelling, field surveys, and analysis.

2. Understanding ranging behaviour of the leopards within and around the Tandoureh National Park to explore any excursion outside the areas' boundaries to surrounding reserves and to evaluate efficiency of the NP boundaries to effectively protect the leopards;

Activities: Live-capturing and collaring of ca. ten individual leopards, monitoring and data collection, analysis.

3. Determination of the leopard seasonal diet as a basis for prey-availability investigation and intensity of human-leopard interaction;

Activities: Investigating leopard kills, scat collection, and analysis.

4. Exploring population status and demographic composition of the leopards within sources areas by means of non-invasive faecal fingerprinting;

Activities: Scat collection and storage, DNA extraction, fingerprinting and analysis.

c) Law enforcement

1. Capacity building of local experts and game wardens for effective protection of the area;

Activities: Developing training manual, holding training workshops (2-3 events) for game wardens and experts on leopard ecology, monitoring and conservation.

2. Attracting local decision-makers attention and support to promote conservation of the leopard;

Activities: Describing the project components, giving periodic feedback, discussion of findings, provision of guidelines to allocate “available compensation funds” properly to high risk areas.

3. Dissemination of the project outcomes and findings to decision-makers to improve management.

Activities: Holding meetings with regional and national authorities.

4. To establish trans-boundary partnership with colleagues from Turkmenistan in order to motivate the extension of similar surveys in the sub-species range in that region.

Activities: Exploring potential partners, organizing meeting to share experience and probably to arrange field excursion and hosting training workshops for local rangers.



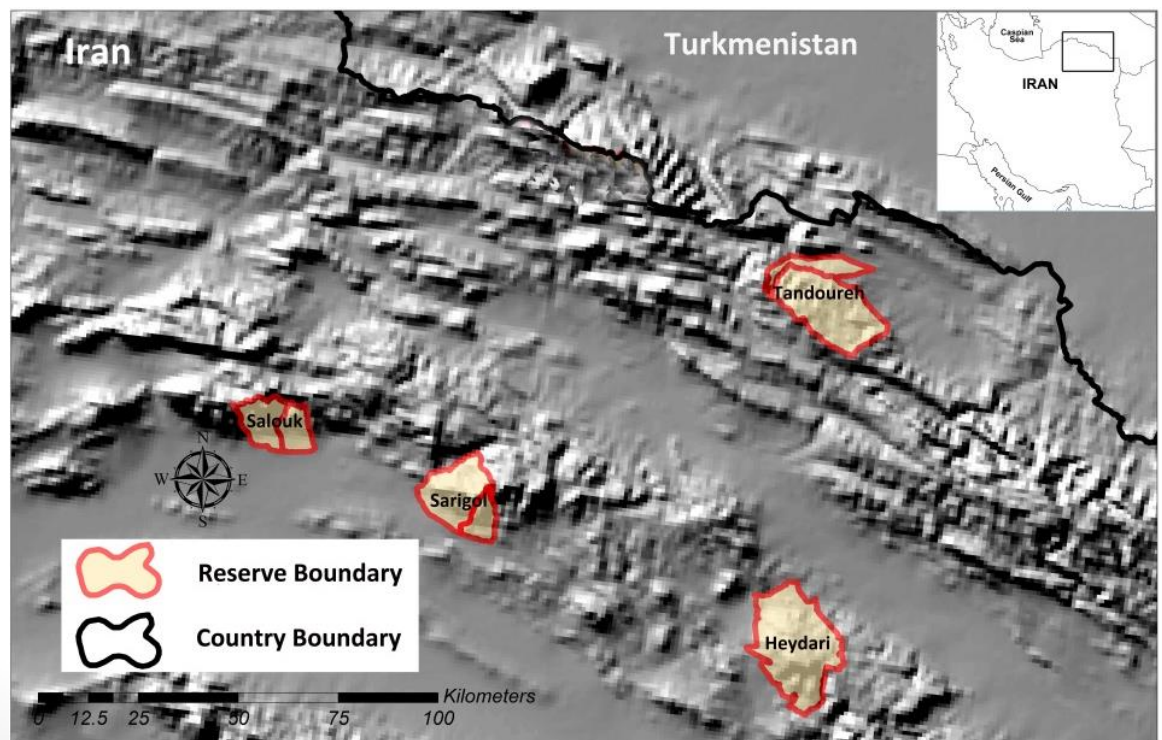
Project Sites

At the eastern extreme of the Irano-Anatolian Biodiversity Hotspot, the Kopet Dagh and Aladagh Mountains in northeastern Iran host a number of montane reserves, including Tandoureh, Salouk, Sarigol and Heydari (E57°15' to E59°15', N36° 20' to N37°20').

Located in two provinces of North Khorasan and Khorasan Razavi, they cover almost 1,395 km² of mountainous landscapes with altitude range of 1000 to over 3000 meter a.s.l., and with enormous cliffs and deep valleys. Generally, the mean annual precipitation and temperature are between 200 to 300 mm and ca. 15°C, respectively leading to the development of a temperate semi-arid climate. Potential ungulate prey in the leopard diet includes urial *Ovis vignei*, Wild goat *Capra aegagrus*, and Eurasian wild pig *Sus scrofa*. These areas also supports diverse range of carnivores, including gray wolf *Canis lupus*, striped hyena *Hyaena hyaena*, wild cat *Felis silvestris*, and Pallas' cat *Otocolobus manul*.

Livestock grazing is not permitted within National Parks. Nonetheless, a number of livestock nomadic pastoralists' herds are permitted to graze the adjacent protected area (in Tandoureh, Sarigol and Salouk) and Heydari Wildlife Refuge during summer (May-August) each year.

Moreover, local people residents living in surrounding villages keep domestic animals, mainly sheep *Ovis aries* and goat *Capra hircus*.



Human-dimension

Economic Loss of Local Communities due to Persian Leopard in Northeastern Iran

The leopard is amongst those large carnivores implicated in livestock depredation across its vast global range (Sathyakumar 1992; Johnson 1993; Ramakrishnan et al. 1999; Maheshwari 2006; Edgaonkar 2008, Aryal and Kreigenhofer 2009; Ramesh et al. 2009, (Martins et al. 2011). Major conflict between man and the leopard originated from attacks and predation on domestic herds of sheep, goats and camels in west Asia (Al-Johany 2006, Farhadinia et al. 2009).

In Iran, there is less scientific understanding among managers and decision-makers on the extent of carnivore-human conflict. Moreover, human attitudes to conservation of the Persian leopard have never been assessed in west Asia, except by Khorozyan (1999). Inadequate understanding of the ecological and social issues of human–carnivore conflicts often hinders the formulation of effective management strategies (Bagchi & Mishra, 2006). Study of public opinion and knowledge of the human dimension in research have become important elements in carnivore conservation management (e.g. Sillero-Zubiri & Laurenson 2001, Bath 2009). As an evaluative tool, such research can help large carnivore managers be more adaptive and thus effective in their management solutions (Majic & Bath 2009). Therefore, a systematic assessment has been initiated to examine the extant of interaction between these wild predators and local communities around three major leopard source areas in northeastern Iran.

We interviewed more than 80 herds of livestock, belonging to more than 300 households around Tandoureh, Sarigol and Salouk where the leopards are

intensively roaming. The data establishes a baseline for perception of conflict, which will be updated and extended in the coming year.. Analysis will be completed in 2014.

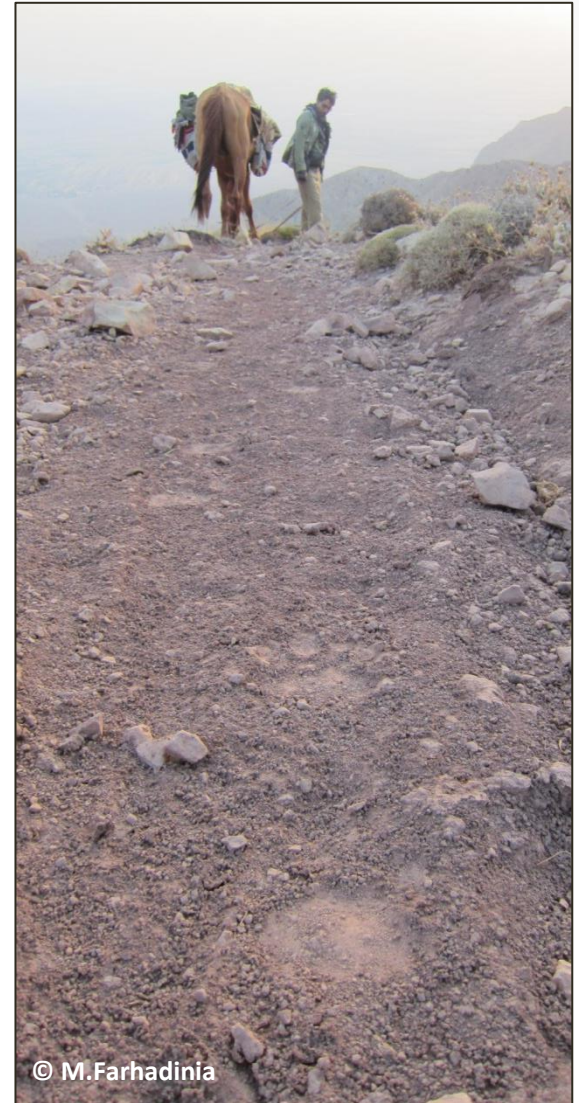


Biological Studies

Landscape-scale assessment of Persian leopard spatial distribution in NE Iran

The need for status assessment of the Persian leopards based on robust scientific methods has been recognized by conservationists and biologists (Kiabi et al. 2002), particularly large-scale efforts of spatial distribution. The considerable constraints mountainous landscapes impose on monitoring efforts have caused general ignorance of mountain-living big cats. First, large scale surveying is usually difficult due to logistic limitations across remote areas. Second, while it is often simpler to detect the presence of the species within a sampling unit, it is much more challenging to ascertain absence, especially for the Persian leopards which exist in low density (Kiabi et al. 2002). Where the study area is remote and access is difficult regular visits are impractical. Instead the site can be partitioned into spatial subunits where detectability-based monitoring methods are applied (MacKenzie et al. 2006).

Occupancy modeling using repeated detection/non-detection surveys is a useful tool for population monitoring of rare and elusive species (MacKenzie et al. 2002; Royle & Nichols 2003) which has been commonly used for a variety of taxa across numerous global terrestrial ecosystems. Recently, the methodology has been applied to explore wide-scale distribution mapping and trend assessment of large carnivores, such as tigers *Panthera tigris* (Karanth et al. 2011, Wibisono et al. 2011) and jaguars *Panthera onca* (Sollmann et al. 2012, Petracca et al. 2014). However, while the methodology has been also suggested for monitoring of big cats in mountains (Jackson et al. 2013) by means of sign detection, it is still not widely applied in Asian montane landscapes (Khorozyan et al. 2010; McCarthy et al. 2010, , Suryawanshi et al. 2013).



The present investigation was carried out in order to provide a benchmark, landscape scale assessment of the spatial distribution of the Persian leopard in northeastern Iran where hosts some of the well-known leopard reserves in west Asia. Furthermore, we employed occupancy modelling within mountainous ranges to understand various covariates related to prey status, human disturbance and law enforcement affecting the predator's distribution across multiple reserves.

A resolution of 25 km² as grid cell size was chosen to enable us detecting range changes in any probably future monitoring effort as well as future potential linking of the occupancy parameter to a wide Persian leopard abundance measure, based on recommended sampling unit size for the Caucasus eco-region (CLWG 2011). In order to cover 46 grids, we had 212 one kilometer transects, yielding an average of $4.6 \pm \text{SE } 0.3$ transects per grid (ranging 2-7).

With the exception of the the Heydari site, where no leopard signs were found (one dubious record was discounted), 45.5 to 67.8% of each area's transects contained at least one leopard sign. Most of large carnivores' tracks belonged to the leopards (n=38), whereas grey wolf and striped hyena were confirmed based on 6 and 8 tracks, respectively. Furthermore, we recorded leopard scrapes at 81 locations. Our naive occupancy estimate was 0.72 (33/46 grids) for the entire region or 0.85 (33/39 grids) for reserves where the leopard was detected.



Prey assessment

The Persian ibex, urial wild sheep and wild pig, are the predominant sympatric prey for the Persian leopards in NE Iran (Ziaie 2008). Leopard density has been shown to be correlated with the density of medium-sized ungulate prey (Henschel et al. 2011). However, prey items are not equally likely to be killed the leopards which can be an indication of prey preference. For example, suiforms are not generally preferred by the leopards (Hayward et al. 2006), while bovids contribute predominantly to the leopard diet (Farhadinia et al. 2014).

Detailed knowledge of the local population dynamics of prey species is essential in the conservation and recovery of small wildlife populations (Enk et al. 2001). Estimating ungulates population parameters and determining causes of mortality are imperative for the proper management of preys and predators (Aryal et al. 2010). Therefore, we provided basic assessment of wild ungulates, particularly urial wild sheep and Persian ibex, both key prey species for the Persian leopards (Ziaie 2008, Farhadinia et al. 2014). These can be used by managers and decision-makers for monitoring the game populations.

Within each transect, we used 12*42 binoculars to find ungulates, particularly at ridges and vantage points. Details of each sighted wild ungulate group were recorded with the name of the species, herd size, sex/age structure, and location. Sex was determined only for bovids, based on the size and shape of the horns for bovids.

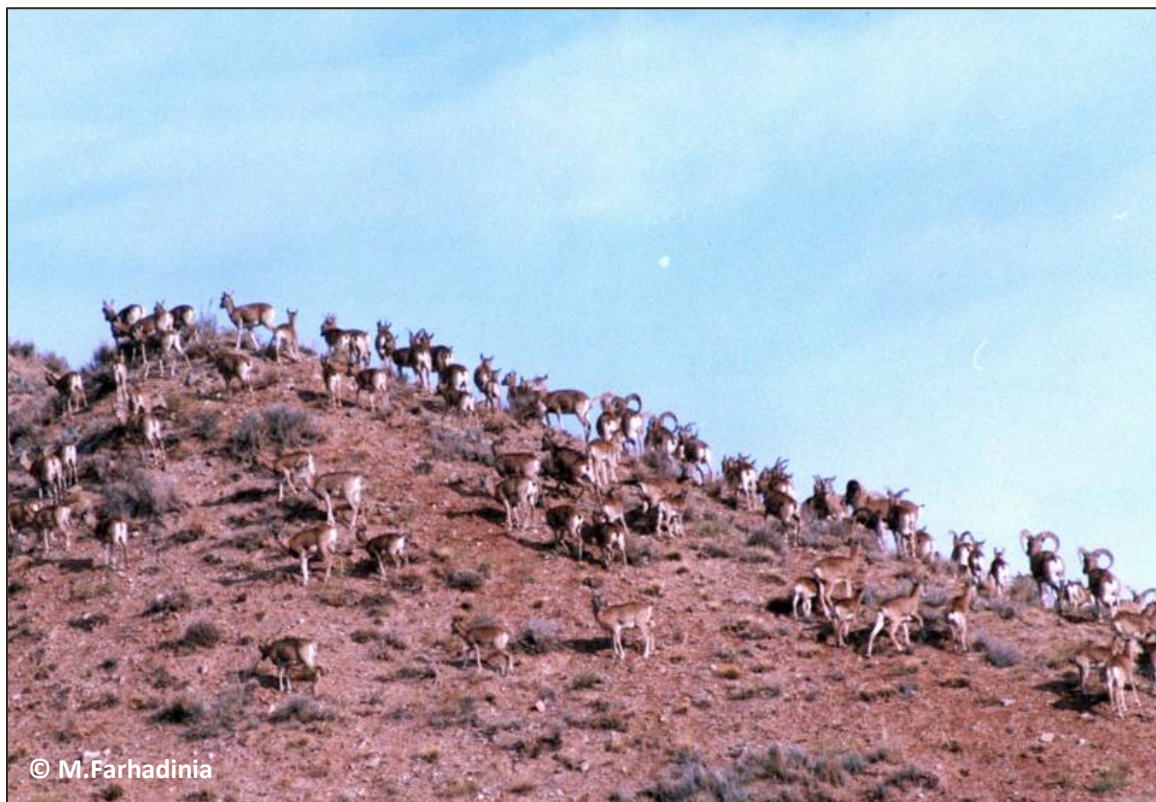
During summer field surveys, we counted a total of 1330 of three species of wild ungulates existing within investigated reserves. The most common wild prey species found was urial sheep (73.2%; Table 1) recorded in 86 groups. While boars were recorded from the entire region based on sign surveys, they were directly seen only half of the study sites. Totally, wild ungulates were directly seen in 32 blocks (69.6% of the surveyed units).

The urial's sex ratio constituted 82.9 males per 100 females in Tandoureh, followed by 53.9 for Heydari. Both Sarigol and Salouk had the lowest male/female ratio, 9.1 to 11.1 adult males per each 100 adult females. Furthermore, while overall contribution of female urials to different area's urial population seems to be fairly similar; however, males (adult and young) occupy a smaller portion of the population comparing in Sarigol and Salouk comparing to Tandoureh and Heydari.

Table 1 Details of wild ungulates sighting in northeastern Iran

| Reserve | # Urial (%) | # Ibex (%) | # Boar (%) | Total Wild Ungulates |
|-----------|-------------|------------|------------|----------------------|
| Sarigol | 37 (63.8) | 7 (12.1) | 14 (24.1) | 58 |
| Salouk | 378 (99.5) | 2 (0.5) | 0 (0.0) | 380 |
| Tandoureh | 412 (55.4) | 332 (44.6) | 0 (0.0) | 744 |
| Heydari | 146 (98.6) | 0 (0.0) | 2 (1.4) | 148 |
| Total | 973 (73.2) | 341 (25.7) | 16 (0.01) | 1330 |

Overall, lamb to adult female ratio was 0.6/1 across the entire region, ranging from 0.5 in Tandoureh, to 0.6 and 0.7 in Heydari and Salouk, peaked in Sarigol, i.e. 0.8 lamb per each ewe. Our sign surveys indicated that medium-sized ungulates are still widespread across surveyed reserves; meanwhile, we sighted ungulates within 47.8% of blocks, including all blocks in Salouk.



Genetic Fingerprinting to Assess Demographic Composition of Persian Leopard in Northeastern Iran

Studying elusive cats in high and rocky elevations needs a combination of methods to monitor them through the time. Noninvasive monitoring techniques such as remote camera trapping (Karanth & Nichols 1998) have been developed as a useful tool for monitoring rare and cryptic species, including the leopard (Balme et al. 2009). As an individually identifiable carnivore, it is feasible to calculate relative abundance and population density estimates after appropriate mark-recapture experimental design and analysis (Karanth & Nichols 2002).



However, there is a great need for other non-invasive approaches to monitor these cat populations more accurately. Population genetics studies may provide the means to address camera trapping inadequacies for population size and sex-ratio estimation. In addition, genetic analysis can determine whether leopard populations suffer from a reduction in genetic variation, an alteration in population structure, and low levels of gene flow between disconnected and fragmented reserves.

Accordingly, we are applying DNA fingerprinting technique to explore population composition of the leopards across multiple reserves in NE Iran. →In 2013,

nearly 200 fecal samples were collected and stored in alcohol for genetic-based population investigations. More intensive sampling and lab analysis will be done in 2014.

Law Enforcement

Since experts and game wardens have an important role in conservation, a specific capacity building program is being designed. Game wardens are being encouraged to participate in survey work. Compensation programs are sometimes used by the Iranian DoE, so experts need additional knowledge to act as inspectors wherever there is a claim. This needs special training and materials to optimise the benefits for conservation... Simultaneously, the relevant authorities will be met regularly to share the project findings. By this means, management can be adapted to integrate the needs of local people and reduce the motivation for leopard poaching.

Therefore, two workshops were planned for 2013, one within each province capital. However, due to some administrative difficulties in North Khorasan, the workshop was asked to be postponed. Therefore, only one official workshop was held in Mashad, the main city in northeastern Iran with representatives from different reserves in order to provide practical and scientific knowledge regarding ecology and conservation of the leopards in Iran. There are more plans to promote conservation through provision of expertise in 2014.



Unexpected Events

In 2013, two unexpected events with potentially serious ramifications occurred for the project, both in August in Tandoureh National Park. During survey for leopard signs, Arash Moharrami encountered two horned vipers while on horseback in the mountains. Unfortunately, before safely dismounting, the horse took fright and he got 'hung up' on the stirrup. He was badly injured because his leg was stranded to the horse saddle. So, the scared animal ran away and his head was injured. That night, we quickly left Tandoureh and went to the nearest hospital for treatment.



Just a few days later, Mohammad Farhadinia encountered a group of poachers. He writes: "while we were searching for the leopard signs along a ridge at the area's border, we found fresh tracks of two humans, supposedly to be poachers. So, we decided to follow them and finally we found them. We carefully approached them as they hid from a group of 16 urial sheep. Their shooting not successful and the animals ran away. We stealthily approached one of the hunters who was lying at the top of a cliff, .We were then attacked by three of his companions,).

They took our weapon and also our camera and cell phone. However, before losing the camera (I was filming everything, from faces to rifles to have an evidence), I quickly removed the SD card during conflicts. Finally, we had no chance to leave them because we have proper evidence (and they did not



checked my camera that it had no SD card!! I was lucky). We hid the SD card among rocks and walked 10 kilometer to the nearest village. In the afternoon, game guards went back to the place and found the SD card which has been submitted to the court. Here is the last picture I got with my camera while we were hidden for the poachers". Later, the poachers were arrested and Mohammad was initiated to the court as witness, but they denied to be the persons in the film, despite clear evidence.

Project Administration

Local field assistants

Arash Moharrami



MSc biology

Iman Rostami



BSc environmental
sciences

Kaveh Hobeali



BSc environmental
sciences

Partners in 2013



Donors in 2013

people's trust for
**endangered
species**



Thank You!

I sincerely thank Iranian Department of Environment for administrative support and provision of necessary permissions. Special thanks go to DoE offices in Mashad, Esfarayen, Heydari, Dargaz and Bojnurd.

I am greatly indebted to the Mohamed bin Zayed Species Conservation Fund because of recognizing this project to deserve a conservation award. Special thanks go to Nicolas Heard for his patience to arrange the grant transfer. We are grateful to the People's Trust for Endangered Species (PTES), particularly Jill Nelson and Nida Al-Fulaji for their hassle-free nature of the grant disbursal, who allowed us to use it in the best way possible to conduct a serious survey on the Persian leopard. Furthermore, IdeaWild is thanked for provision of basic equipment for field work. As the next step of this project, our "Collar4Conservation" initiative was kindly endorsed by the EAZA Felid Tag, especially Alex Sliwa and Gregory Breton which are appreciated.

Special thanks go to Professor David Macdonald, Dr Paul Johnson and Dr Luke Hunter for their technical assistance and support to the project. Furthermore, I am grateful to Dr Dawn Burnham and Dr Christos Astaras in WildCRU and Toni Wheeler, Ruth Jackson and Sam Gannon in Oxford's Department of Zoology's financial office for their help and support with administrative issues. Finally, I feel a privilege to express my frank sympathy and respect to local experts and game wardens as local partners of this project due to their kindly cooperation in field surveys, particularly M.Taghdisi, H.Fakhrani, A.Hosseinzadeh, M.Ahmadi, S.Grivani, G.Pishghadam, Azim, F.Salahshour, for their field assistance.



A family of three leopards in Tandoureh/December 2013

(© A.Bargar)

Plans for 2014

During second half of 2013 when the project was implemented, a remarkable part of the team energy was spent on administrative issues, including getting necessary permissions, field coordination, team building and training, procurement of necessary equipment, etc. As a result, 2014 is expected to have various field-based activities.



The project will carry out “Collar4Conservation” initiative which is to understand fine-scale ranging pattern and movement of the Persian leopards using satellite tracking. We expect that our project can explore new, non-protected corridors between main reserves as well as trans-boundary landscapes between Iran and Turkmenistan.

Also, we are producing a conservation manual, aiming to provide useful information for rangers and experts at local level in order to protect the leopards. Also, they are expected to become wildlife inspectors, enabling them to investigate conflict cases in order to guide exiting compensation funds more effectively.

Field surveys and monitoring will be continued and optimized to explore more less-known aspects of the Persian leopard ecology in west Asian montane landscapes. Meanwhile, after learning human leopard interaction in the area, community-based programs are planned.

