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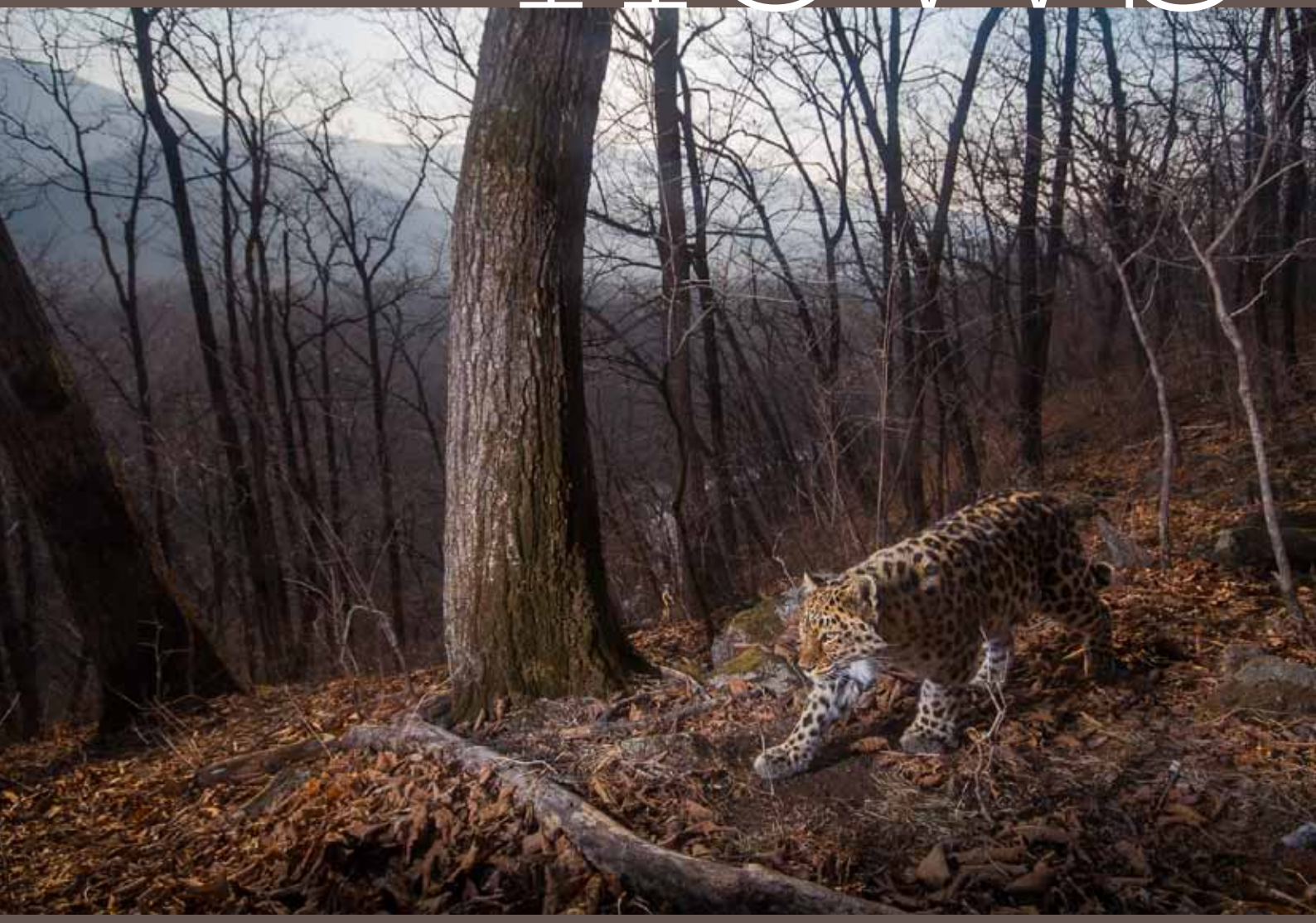

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# The illegal use of snares and gin traps threatens endangered leopards in Iran

**We report on six cases of snare and gin trap captures of free-ranging Persian leopards *Panthera pardus tulliana* in northern Iran between 2012 and 2017. Three of these leopards died as result of severe injuries, the three others were rescued, one survived albeit disabled, two could be released to the wild but one of them died less than two months after release. These captures were unintentional, and resulted from snares and gin trap being deployed illegally by farmers to rid their crops and chicken-coop from wild boars *Sus scrofa* (5) and possibly jackals *Canis aureus* / jungle cats *Felis chaus* (1), respectively. These cases reveal the growing problem of habitat disturbance and loss for leopard and their natural prey in the Alborz mountain range and Caspian lowlands of Iran.**

**Fig. 1.** An anesthetised female Persian leopard with a gangrenous process affecting its left fore-limb. The animal was unintentionally snared, rescued by the Department of Environment of Golestan Province, and sent 18 days later to Tehran for treatment, January 2012 (Photo I. Memarian, Tehran Zoo and Pardisan Wildlife Rehabilitation Center).

Leopard *Panthera pardus* populations have been reduced globally due to continued persecution with increased human populations, habitat fragmentation, increased illegal wildlife trade, excessive harvesting for ceremonial use of skins, prey base declines, and poorly managed trophy hunting. This negative trend supported the recent uplisting of the species from Near Threatened to Vulnerable on the IUCN Red List of Threatened Species (Stein et al. 2016).

The leopard subspecies that survives in South-west Asia and the Caucasus (*P. p. saxicolor*, recently revised as *P. p. tulliana* by Kitchener et al. 2017) is listed in the IUCN Red List of Threatened Species as Endangered (Khorozyan 2008). In Iran, where it still has a wide distribution range mainly across the Alborz and Zagros Mountains and their off-shots, it is vulnerable to local extinction in fragmented habitats because of anthropogenic activities (Sanei & Zakaria 2011).

Acknowledging that the information was probably incomplete because of the leopard's protected status, Kiabi et al. (2002) proposed that deliberate killing because of their alleged attacks on livestock was probably one of the main threats to leopards in Iran since the mid 1970's. These authors mentioned also accidents with cars and habitat loss as two important additional threats to the leopards. Sanei & Zakaria (2011) ranked in decreasing order of likely incidence, (1) habitat destruction, degradation and fragmentation; (2) illegal hunting and poaching of leopards (in an attempt to destroy predators that may prey on livestock) and their prey species, poisonous lures, capturing juvenile of prey species, as the two main groups of threats to leopards in Iran. In a review of 71 mortality cases throughout the country between 2007-

**Table 1.** Summary information for six Persian leopards captured accidentally in metal snares and gin trap in northern Iran, between 2012 and 2017.

| Case no. | Estimated age (years) | Sex | Date | Province | Trapping device[1] | Body part trapped |
|---|---|---|---|---|---|---|
| 1 | 0.5 | Female | Jan. 2012 | Golestan | Metal snare | Fore-limb |
| 2 | 2 | Female | Feb. 2012 | Gilan | Metal snare | Neck |
| 3 | 10 | Male | Nov. 2013 | Mazandaran | Gin trap | Fore-limb |
| 4 | 7 | Female | Feb. 2017 | Gilan | Metal snare | Waist |
| 5 | 10 | Male | Feb. 2017 | Mazandaran | Metal snare | Waist |
| 6 | 5 | Male | May 2017 | Mazandaran | Metal snare | Neck and fore-limb |

[1]Snares and the gin trap were deployed against wild boar (cases 1, 2, 3, 5, 6) and possibly jackal and jungle cat (case 4).

2011, Sanei et al. (2012) found that 70% of documented mortality resulted from intentional killing and poisoning, followed by road accidents (18%).

The present report documents six cases in the course of the last 5 years of leopards being caught accidentally in snares or gin traps (i.e. 'terrestrial by-catches') that were set by local people against wild boars and possibly in one case against jackals and jungle cats. It details the type and diversity of lesions resulting from these trapping methods, and informs a broader audience about the newly reported threat posed by snares and gin traps to leopards in Iran.

**Case reports**

*Case 1*

On 27 January 2012, local people near Gorgan, Golestan Province, found a Persian leopard trapped by a leg in a wire snare deployed against wild boar (Table 1). The staff of the Department of Environment captured it and transferred it 18 days later to the Faculty of Veterinary Medicine, University of Tehran, where it underwent thorough examination and treatment. Clinical investigations revealed a deep incision located immediately above the radio-carpal joint (wrist) of the left foreleg, with damaged underlying soft tissues and a swollen post-traumatic foot with greyish mottled skin (Fig. 1). During anaesthesia recovery the animal was unresponsive to pain when pinched between toes of the left forefoot in contrast to a clear reaction of the other three stimulated feet. Ultrasound and radiographic examinations of the left forelimb confirmed severe ante-brachial muscle, tendons, and radial nerve injuries associated to a wet gangrene of the distal end of the foot. The presence of a potentially life-threatening gangrenous process commanded a trans-humeral amputation, carried out two days later. Following a prolonged antibiotic treatment, the animal recovered successfully from the operation and was transferred to the Tehran Zoo (Fig. 2).

*Case 2*

In February 2012 local people reported to the main office of the Department of Environment of Gilan Province a snared leopard near the Siahkal County, close to Deylaman Prohibited Hunting Area. The animal was found dead, strangled by a wire snare set by local farmers to stop wild boars from raiding their crops.

*Case 3*

In mid-November 2013 local people in Mazandaran Province spotted a lame leopard with a metal gin trap hanging from the distal end of the right forelimb. Gin traps are occasionally used in Mazandaran to control wild boars considered as pest to agriculture (Head of Mazandaran DoE, pers. comm.). Then on 3 January 2014 local farmers found near Tonekabon County, Mazandaran Province, less than 5 km from the location of the first observation, a leopard with a recently amputated right foot. The leopard believed to be the animal observed 1.5 month earlier was recumbent and paralysed on the hind limbs. It was anaesthetised and transferred to the Faculty of Veterinary Medicine, University of Tehran, where it underwent clinical and radiographic examinations. The animal was in medium body condition with signs of mild dehydration, and had a partially healed amputation of the right foot at carpal joint level with no signs of local infection or necrotic process (Fig. 3). Radiographs of the right forelimb, confirmed the amputation of the foot with distortion of carpal bones, and active laminar periosteal reactions in several regions of the distal part of the affected limb, possibly as a reaction to repeated trauma or infectious processes. Further radiographs of limbs, thoracic and abdominal areas revealed the presence of a 7-10 days old comminuted fracture of the right ulna associated with fragments of a metal foreign body, and at least seven fragments of metallic foreign bodies in the dorsal region of the right scapula, on the right side of the 10$^{th}$ thoracic vertebra, and in the fifth (L5) and sixth (L6) lumbar vertebrae. Metallic fragments associated with vertebral injuries were 0.8 to 1.3 cm in length. A computerised-tomography CT scan (Siemens dual detector, 130 KVp, 97 mAs, slice thickness 1.0 mm) with results evaluated in transverse scans and three dimensional reconstructions with implant and bone algorithm, confirmed the presence of a metallic fragment in the spinal canal of L6 which was likely responsible of the paralysis of hind legs. In 3-D reconstruction, a hole in the right lateral pedicle of L5 was detected featuring the pathway of the foreign body found in L6. The animal showed no deep pain sensation and no proprioception in the hind limbs. Due to the bad prognosis of the vertebral injuries, the presence of multiple metallic foreign bodies and assumed suffering, the animal was euthanised. The necropsy confirmed the irreversible nature of lesions of the spinal cord in L6 canal associated to the presence of a bullet fragment (Fig. 4). The animal seemed to have been recovering from the foot amputation when it was shot on repeated occasions with at least two different firearms.

*Case 4*

Local people found an adult female Persian leopard on 4 February 2017 near Rudsar County in Gilan Province, Iran. The animal was paralysed in both hind legs. It was anaesthetised and moved to the Pardisan

Wildlife Rehabilitation Centre in Tehran. Clinical examination confirmed thinness, severe dehydration (>10%), an atrophy of hind limb muscles, and partial paralysis of hind legs with weak reaction to pain and lack of proprioception. There were also conspicuous skin lacerations in the lateral side of the right flank and the dorsal retroperitoneal region with associated infection and reactive inflammation (Fig. 5). A CT-scan investigation confirmed a muscular atrophy of the hind limbs, and a 5 cm long laceration in the right lateral aspect of L5 extending to the dorsal retroperitoneal region. More importantly, it revealed a depressed fracture of the vertebral arch lamina and transverse process on the left side of L4 with a 4 mm long fragment compressing the spinal cord from the left dorso-lateral aspect of L4 (Supporting Online Material SOM F1). Large amount of speculated, ill-defined, bright new bone formations were also found along L2 to L5 vertebrae bodies.

The animal was diagnosed with an old (3-10 days), depressed open fracture of the arch lamina of L4 and an active, chronic bacterial osteomyelitis of L2 to L5 related to the open fracture. The cause of the fracture and skin laceration was suspected to be a metal snare encircling the abdomen and lumbar dorsum (waist) of the animal. The animal had succeeded to release itself from the snare. It was operated in a private veterinary hospital in Tehran to stabilise the lumbar rachis with a double metal plate fixation, and transferred to the Qazvin zoo for recovery. The radio collared animal was reintroduced into the wild on 5 November 2017 but was found dead less than 2 months after the release.

*Case 5*

On 27 February 2017, local people reported a leopard trapped in a snare deployed for wild boars near Pasand Village in Mazandaran Province. When approached by wildlife rangers and a veterinarian the animal was found recumbent, noticeably without any snare, but with the presence of sticks, a crowbar and empty syringes around the place, suggesting that the animal had been assaulted and/or medicated. The animal was behaving abnormally, lacking aggressiveness against people, possibly as a result of having been drugged. It was anaesthetised and moved to a local veterinary clinic where it underwent more thorough examinations. The leopard was in good body condition with no indication of significant weight loss or dehydration and presented a recent, marked, skin bruising around the lower abdomen and lumbar area suggesting that it had been trapped in a snare by the waist but for a relatively short period of time. Radiographic examinations did not detect any significant osteo-articular lesions. It was moved to a rehabilitation facility in Semeskandeh Wildlife Refuge, Mazandaran, with the intention to release it after recovery. However, for the following days the animal was listless, abnormally unresponsive to stimulations and refused to eat. It died on 5 March 2017, shortly after being re-anaesthetised for further examination. The necropsy confirmed its good body condition with presence of subcutaneous and abdominal fat deposits. The main necropsy findings included a recent subcutaneous haemorrhage around the lower abdomen and lumbo-dorsal area of the animal (SOM F2), the presence of a porcupine spine transfixing the throat but with no damages to vital organs, a haemorrhagic stomach content and a generalised congestive syndrome. The cause of death of the animal remained mysterious but could be related to a possible injection of a poisonous substance by local people or a neurologic problem.

*Case 6*

On 12 May 2017, local villagers found a snared leopard near the border of Paband National Park in Mazandaran province. The alerted wildlife rangers accompanied by a veterinarian anaesthetised the leopard to remove a metal snare set against wild boars and encircling its neck, upper left thorax and left forelimb. The animal was transferred to Semeskandeh Wildlife Refuge for further examination and recovery. Because of the inappropriate cage it suffered additional traumatic facial injuries during its transportation. The snare had incised the skin but was not responsible of significant lesions to the underlying tissues, suggesting also that the capture was recent (Fig. 6). Skin lesions were treated and the animal was radio-collared and released on 16 May 2017, about 3 km away from the capture location.

As the paper goes to print a new case of lethal leopard snaring occurred in Mazandaran Province in April 2018 (see SOM F3 & F4).

**Fig. 2.** A female Persian leopard five years after the trans-humeral amputation of its gangrenous left forelimb resulting from a wire snare capture in Golestan Province, Iran, July 2017 (Photo P. Tabrizizadeh, Tehran Zoo).

**Discussion**

The information compiled in the present study confirms that accidental capture by snare and gin trap deployed against wild boars and possibly also jackals and jungle cats threatens leopards in northern Iran. Because of their protected status under the Harvesting and Hunting Law (23 August 1999, Section Che, Article 3), which only allows hunting of leopards under a special license issued by the Department of Environment, it is in general difficult to obtain accurate information on the extent of captures and destruction of leopards in Iran. It is therefore not possible to know whether this surge of accidental leopard captures corresponds genuinely to an emerging threat, as suggested by the lack of documented reports earlier than 2012, or to an increase

in reporting as a result of the recent rise of information communication technology in Iran, and particularly social media communication (e.g. Shirazi 2012).

Snares and gin trap caught Persian leopards by different parts of their bodies and with variable effects (Table 1). Captures with metal snares resulted in skin incisions, and for three out of five cases, in significant damages to underlying tissues combining tearing and necrotic processes of muscles, in one case a wet gangrene and in another osteomyelitis. Animals found after prolonged capture also suffered a very significant loss of condition as a result of struggling and starvation. The one case of snare capture by the neck induced strangulation and probably quick death. The one case of gin trap capture resulted in the delayed self-amputation of the foot at carpal joint level yet with relatively limited damages to other tissues and indications that a natural healing process was in progress. Although the animal could survive in nature on three feet for at least 1.5 month after being trapped, the amputation increased the animal's vulnerability to humans.

The impact of snares and gin traps on captured leopards was significant as it resulted in a natural or induced (euthanasia/poisoning) case fatality rate of 50%. One rescued individual could survive in captivity but will never be released into the wild, two leopards could be released but one died within two months of being released. The indiscriminate accidental trapping of leopards in northern Iran is probably underestimated and because of its associated mortality level, it likely affects the long-term viability of the leopard population by removing mature individuals of both sexes (Table 1) from a population already assessed to decline (Khorazyan 2008).

Investigations carried out by the Department of Environment concluded that five out of the six reported cases of leopard trapping corresponded to non-intentional captures in traps deployed against wild boars and possibly in one case against jungle cat and/or jackal. The wild boar and jackal have been considered for long time pests in many parts of Iran because of the damages they cause to agriculture crops and livestock, respectively (Firouz 2005). Fifty years ago the Game and Fish Act (Year 1967, Chapter 3 of the executive directive) listed these species among several others as 'vermin', requiring only an ordinary hunting license to be hunted, except for farmers and shepherds desiring to rid their lands of them, who required no license at all to do so and throughout the year outside protected areas and wildlife parks. The most recent update of the Hunting and Harvesting Law (23 August 1999) has rendered the legal hunting of wild boars more difficult. The species is no longer considered a pest, its legal hunting is restricted to religious minorities, only one individual can be taken per day and per hunter, and the fine for illegal hunting reaches eight million Iranian Rials (about 215 Euros). The regulation requires to be revised to allow a more efficient control of the population.

In Iran wild boars occur often in large numbers due to lack of hunting because of religious restriction on their consumption. The general trend of their population is not accurately documented but locally there are claims of a significant increase such as in Golestan National Park (Ghoddousi et al. 2017a) or in the province of Khuzestan (H. Jowkar, pers. comm.). The local increase is possibly also facilitated by a decrease in their natural predators: the wolf *Canis lupus* and the Persian leopard (Khalilzadeh et al. 2016). The role of leopards regulating wild boar populations in Iran is the subject of on-going research. Because of the widespread over-hunting of ruminant ungulates, Ghoddousi et al. (2017b) have hypothesised that the dependence of Persian leopards on wild boars is expected to increase in the country. Yet because of the risk of injury inherent to wild boar predation (Qi et al. 2015), they raised concern over the long-term viability of this dietary shift. The present report suggests that such a shift could also prove deleterious to the species because of the risk posed to leopards by the indiscriminate control methods used by farmers against wild boars.

In the Caspian lowlands the significant expansion of cultivated lands over the natural habitat of Persian leopards and wild boars as a result of the doubling of the human population between 1976 and 2011 (Khosravi 2012) is likely to increase the risk of capture and destruction of leopards through accidental snaring. It is significant that the snaring cases we report in the present paper occurred in transition areas between mixed forest and rural habitats. Wild habitats converted to cultivated lands benefit wild boar's omnivorous diet and indiscriminate appetite and may also increase the risk of leopard by-captures in the course of illegal hog control attempts. Paradoxically, the inadvertent destruction of

**Fig. 3.** An anesthetised Persian leopard showing a partially healed amputation of the right foot at carpal joint level with no signs of local infection or necrotic process. The amputation was caused by a gin trap deployed against wild boar, Mazandaran Province, Iran. November 2013 (Photo A. S. Panah, Pardisan Wildlife Rehabilitation Centre).

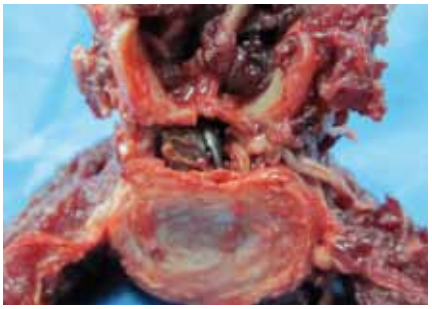

**Fig. 4.** An irreversible lesion of the spinal cord in the canal of the sixth lumbar vertebra of a Persian leopard associated to the presence of a bullet fragment, Mazandaran Province, Iran, November 2013 (Photo I. Memarian, Tehran Zoo and Pardisan Wildlife Rehabilitation Center).

**Fig. 5.** Severe injury of skin and underlying tissues caused by a metal snare encircling the waist of an adult Persian leopard, Gilan Province, Iran, February 2017 (Photo A. S. Panah, Pardisan Wildlife Rehabilitation Centre).

one of their few recognised predators in an attempt to curb their demography may ultimately lead to the further expansion of wild boars in the area.

There is an urgent need to stop the widespread use of snares and gin traps in Iran as a control method to wild boar populations, which also affects other mammals from small Mustelids to large Ursids (I. Memarian, pers. obs.). The Hunting and Harvesting Law (23 August 1999) stipulates that the use of traps and nets of any type and variety, except for the capture of ducks, is strictly prohibited nationwide (Prohibition Chapter B, Article 8). Unfortunately the relative indifference towards the growing population of wild boars by authorities leads to untrained villagers and farmers taking matters into their own hands and using illegal methods of control to rid their crops from hogs. Although the response to this situation requires better law enforcement, it should be combined to synergic conservation actions that would aim to

1. Limit leopard habitat loss caused by the expansion of agriculture into forested habitat;
2. Enhance the protection of the suite of natural prey species of leopards in the area;
3. Promote conflict deterrent methods for wild boars (e.g. electric fencing);
4. When inevitable, organise wild boar control in agriculture areas through approved methods supported by revised regulations, and
5. Promote the fast reporting of accidentally snared/trapped leopards to reduce the level of tissue damages and physiological stress, and ultimately ease their rehabilitation.



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**Fig. 6.** The cutaneous lesion of a metal snare encircling the neck and left forelimb of a Persian leopard snared in Mazandaran Province, Iran, May 2017 (Photo P. Behnoud, Future for Leopards Foundation).

Supporting Online Material SOM Figures F1-F4 are available at www.catsg.org.

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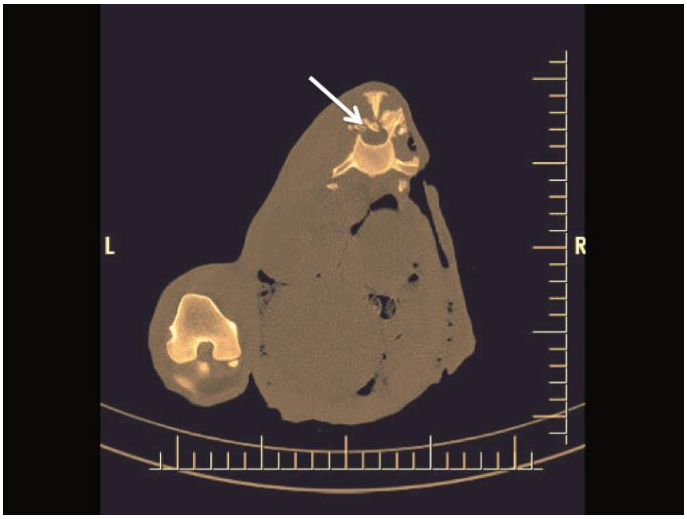


**SOM F1.** A CT-scan image showing a depressed fracture of the vertebral arch lamina and transverse process on the left side of the 4th lumbar vertebra (L4) with a 4 mm long fragment compressing the spinal cord from the left dorso-lateral aspect of L4 (arrow). This severe injury was caused by a metal snare encircling the waist of an adult Persian leopard, Gilan Province, Iran. February 2017 (Photo M. Molazem, Faculty of Veterinary Medicine, University of Tehran).

**SOM F2**. A recent subcutaneous haemorrhage around the lower abdomen and lumbo-dorsal area (waist) of a Persian leopard snared in Mazandaran Province, Iran. February 2017 (Photo P. Behnoud, Future for Leopards Foundation).

**SOM F3**. An adult male Persian leopard was found dead by local people near Khalilshahr city in Behshahr County, Mazandaran Province on April 21st, 2018, and reported to Mazandaran DoE authorities (Photo DoE Mazandaran Province).

**SOM F4**. The animal was dead for several days (ca. 2-4 days), a snare deployed against wild boars raiding nearby crops was responsible of the death. The snare was passing through the mouth, encircling the head (i.e. the crania and rostrum were encircled but not the mandible). The animal was in good body condition suggesting that it died relatively soon after being snared (Photo DoE Mazandaran Province).



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