Chemical Immobilization of Two Snow Leopards (*Panthera uncia*) in Wakhan District, September 2013

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Cover Photograph:

Dr. Hafizullah Noori in Sarkand Valley listening to the heart of anesthetized male snow leopard “Khani Wakhani”, 26 September 2013, Wakhan District, Afghanistan.

Introduction

The snow leopard *Panthera uncia* is a large cat species which occupies alpine and subalpine habitats at altitudes between 3,000 and 6,500 meters above sea level in the mountain ranges of continental Asia. In drier habitats, such as in certain locations in Tajikistan, it is also known to inhabit areas at lower elevations with an abundant prey base. In Afghanistan it is known to occur across the eastern part of the Hindu Kush mountain range and in Pamirs, Wakhan District, Badakhshan Province (McCarthy and Chapron, 2003).

Snow leopards are threatened across their distribution range. Poaching for their pelts, overhunting of their natural prey; retaliation by angry livestock owners who have lost livestock due to depredation; and the capture of live animals for the illegal pet trade, have all been documented factors that reduce the survival of snow leopards, and are the focus of conservation initiatives to decrease their occurrence (Simms et al. 2011).

As part of a scientific study to document the range use and movements of snow leopards in the Hindu Kush Mountains of Wakhan District, the Wildlife Conservation Society (WCS) captured three specimens in 2012 and equipped them with gps-satellite collars (Simms et al. 2013). The present report documents the continuation of this study by a WCS team of Afghan veterinarians and rangers, and details the results of their capture attempts in 2013.

Preparations for the snaring operation

On the 8th of September Hafizullah Noori (HN), Ali Madad Rajabi (AMR) and Stephane Ostrowski (SO) (WCS Wildlife Vet Team in Afghanistan) flew from Kabul to Ishkashim on a PACTEC flight. That same day AMR and SO reached Pagish Village by car and joined the Wakhi snow leopard team already working in the valley. The team was composed of rangers Karmal, Aziz Big, Ayan Big (AB), Panj Shanbe, and their trainer Hussein Ali (HA). HN meanwhile traveled to upper Wakhan to launch a foot and mouth disease vaccination campaign with local paravets. On the 9th of September the snow

leopard team installed nine snare-traps, and three more two days later at locations where team members had found evidence of snow leopard presence during a week of preliminary investigations. All snare-traps were equipped with radio-transmitters that emit a specific signal when triggered. Members of the team would check for signals hourly, round-the-clock from their base-camp[1], and rangers visually checked all snare-traps every second day. On September 15th HN replaced AMR who departed on September 16th to Big Pamir to supervise the annual livestock count.

Capture of a snow leopard in Pagish Valley

Capture and tranquilization

On September 17th HN was on duty for trap-site transmitter check, when at 12:00 pm the pulse rate of transmitter #2 indicated that the associated snare had set off. Karmal and HA quickly departed to inspect the snare from a closer distance. Approximately 20 minutes later they relayed to the other team members waiting at base camp that it had been a false alarm due to a faulty transmitter. The snare was removed and the transmitter brought back to the camp and inactivated.

That same night at 6:00 pm transmitter #1 located relatively close to the faulty transmitter triggered as well. Again Karmal and HA headed up to check the snare, and 25 minutes later informed the rest of the team at base-camp, that an adult snow leopard had been caught. Within 30 minutes, the rest of the team arrived with the capture/tranquilization/monitoring equipment. Two hundred meters from the snare, HA guided HN and SO to the capture site and they examined the trapped specimen from a distance of c. 30 meters.

The snow leopard was identified as an adult. It managed to get its front right foot snared and was trying to free itself, perhaps once it noticed people approaching it. HN estimated the body mass at 40-45 kg and prepared two darts containing 110 mg of ketamine (a dissociative cyclohexane anesthetic drug) combined to 3 mg of medetomidine (a potent alpha-2 agonist drug). The topography was reasonably good, allowing for a short-range

[1] Technical details of trapping are available in Simms et al. 2013.

perpendicular shot and at 6:47 am, on his first attempt, HN successfully darted the animal in the left thigh from a distance of 7-8 m (2 bars). The animal was left alone for 6 minutes, then checked visually, left alone for another 5 minutes, and eventually approached and handled swiftly by SO and HN. It was an adult female (Plate 1). HA removed the snare from the right front leg and noticed that the animal had been snared by 3 toes only. Because the animal was not injured and was breathing normally, the team decided to proceed according to its standard protocol and transported the animal to a flat area located very near to the snare site.

Monitoring and recovery

The anesthesia of the captured leopard went smoothly and was uneventful. Physiological parameters were comparable to measurements made on snow leopards in 2012 (Simms et al. 2013) and within normal range for the species (Johansson et al. 2013), with a regular respiration decreasing in frequency from 48/min at the beginning to 40/min by the end of the procedure. The heart rate was relatively high, remaining between 147/min and 152/min. The rectal temperature decreased gradually from 39.2C˚ to reach 38.3C˚ before reversal. During the anesthesia the animal was measured, and a blood sample was collected on FTA cards for future DNA analysis. It was also carefully examined; the stomach was full and the snaring had caused injury to the claws on the left front and back feet, and extremity of the left mandibular canine. No periodontal disease, no iridocoloboma (a congenital eye anomaly reported in captive-born snow leopards), and no visible malformations were noticed. It was estimated, based on teeth condition, to be 3-4 year-old and was not in a mid or later stage of pregnancy. No ectoparasites (or their feces) were found. Eventually the animals received a microchip (#0006963F4C) under the skin, in the right side of the neck; its eyes were cleaned with normal saline before recovery. GPS-satellite collar #11120 was fitted. At the end of the procedure the animal was moved by all the team to an even flatter area about 200 m from the trap-site. HN injected in the muscle 15 mg of atipamizole as an antagonist drug to medetomidine at 7:49 am and monitored the recovery of the animal from a close, yet hidden site. After 5 min, at 7:54 am, the female was ambulatory and was walking slowly in the direction of the adjacent cliff.

Plate 1: Adult female snow leopard, "Pari", during anesthesia. It was captured, radio-collared and released by WCS research team on 17 September 2013 in Pagish Valley, Wakhan District, Badakhshan Province, Afghanistan.

The animal only stumbled once while it was slowly climbing the slope of the adjacent mountain to the east.

Continuation of the snaring operation and relocation to Sarkand Valley

We continued trapping in Pagish Valley, and on September 19th a red fox (*Vulpes vulpes*) triggered the snare "12" and its associated transmitter without being captured. Then on September 20th at 11:00 pm snares "5" and "3" sent triggering signals. Karmal and AB left within 10 min to check the snares. Checking the closest snare "5", Karmal reported that a snow leopard had stepped into the snare but escaped. AB visiting snare "3" also reported that a snow leopard had triggered the snare and had successfully escaped. Upon verification of the snares the next morning, HA concluded that a single adult snow leopard had first encountered snare "5", but was not captured because it did not step in the middle of the snare, and then, being probably alarmed by the first event, succeeded to avoid capture by snare "3", possibly by removing its foot in time. Based on photo-trapping records in the area, we anticipated that it would be difficult to capture additional snow leopards in Pagish valley within the remaining scheduled period of 10 days. It was therefore decided to try snaring in Sarkand Valley, 40 km east of Pagish. All snares were removed on September 20th and the camp relocated to Sarkand Valley the next day. By the night of 22nd September five snares had been deployed followed by an additional four on the 24th.

Capture of a snow leopard in Sarkand Valley

Capture and darting

On 25th September at 11:00 pm, HN who was on duty informed the capture team that transmitter "7", on the eastern side of the glacial stream had been triggered. Because the snare was the most distant from the base camp, AB, being the fastest of the rangers, was sent to inspect it. AB left at 11:20 pm and at 11:45 pm confirmed that a leopard had been snared. The capture team which had anticipated a successful capture had already crossed the stream headed swiftly towards the trap site. The team stopped about 200 meters away from the snare. HN and HA walked up toward the snare site and estimated the leopard body mass at 40 kg. HN prepared two darts containing 110 mg of ketamine combined to 3 mg of medetomidine. The topography was reasonably flat, allowing for a short distance perpendicular shot and HN successfully darted the animal on his first attempt from a distance of 5-6 meters (1.8 bars) in the left thigh, at 00:19 am. The animal was left alone for 9 minutes then approached and handled swiftly by SO and HN. It was an adult male (Plate 2). The dart was collected, the snare removed from the carpal joint, and the animal blindfolded before transportation to a flat area a couple of meters from the snare site.

Monitoring and recovery

As with the first snow leopard, the anesthesia went smoothly and was uneventful. Physiological parameters were comparable to measurements made on snow leopards in 2012 (Simms et al. 2013) and within normal range for the species (Johansson et al. 2013) with a regular and deep respiration ranging in frequency between 27 – 31/min. The heart rate was initially high measuring at 146/min and decreasing to 124/min by the end of the procedure. The rectal temperature decreased gradually from 39.5C˚ to reach 38.7C˚ before reversal. HN covered the animal with a blanket and folded half of the blanket under the animal to decrease conductive heat loss to the ground. During anesthesia the team measured it and collected hair samples and blood on FTA cards for future DNA analysis.

SO carefully examined the animal, which had a bruising on the right front leg due to snaring, and disinfected this superficial wound. The animal had neither damaged its claws of the left front foot nor any teeth as a result of being snared. No periodontal disease, iridocoloboma or any other anomaly were noticed; the animal age was estimated at 6-7 years-old and its body mass at 40-45kg. Eyes and ears presented no lesions and both testicles were present. The animal lacked visible ectoparasites (or their feces). No microchip was detected so it was identified with a subcutaneous microchip (#0006995F82) implanted in the right side of the neck and its eyes were cleaned with normal saline on two occasions. It was fitted with GPS-satellite collar #11121. At 1:28 am HN injected 15 mg of atipamezole in the dorsal muscles to antagonize the effects of medetomidine. The animal was ambulatory by 1:36 am and walked away slowly before going recumbent again.

Plate 2: Anesthetized adult male snow leopard, “Khani Wakhani”. It was recaptured, radio-collared and released by WCS research team on 25 September 2013 in Sarkand Valley, Wakhan District, Badakhshan Province, Afghanistan.

After a couple of minutes the animal stood up and moved faster towards the ridge of the nearest cliff. After 2-3 minutes of hesitation and against our previsions (and attempts to redirect it towards a safer place), it swiftly descended the precipitous cliff and disappeared in the direction of the valley stream. Thanks to the VHF transmitter appended to the collar, it was located again in the early morning, walking quietly in the south direction on the right side of the stream.

In November 2013, intrigued by the fact that the range use pattern of this male snow leopard was closely overlapping the one recorded for male "Khani Wakhani" (monitored through radio-telemetry between June 2012 and July 2013), a comparison of phenotypes on photographs confirmed that this second leopard was in fact re-captured "Khani Wakhani". The reason "Khani Wakhani's" subcutaneous microchip could not be detected when checked, is unknown.

Lessons learned

Weather and moon conditions - Compared to the capture operation in September 2012, weather conditions during the present operation were very mild with sunny days and no rain. On the other hand the absence of clouds during night was less favorable to captures because of the presence of moonlight that rendered snare-traps potentially more visible to targeted animals. It is worth noting that the one failure to catch a leopard happened during the night of 20th September almost at full moon (which occurred on 19th September).

Capture rate – In 2012 the team captured three snow leopards over approximately 280 trap-nights. This equates to one capture every 93 trap-nights. In 2013, using the same method and an average number of deployed snares at a time of 5 and 10 in June and September respectively, the team captured two snow leopards over 186 trap-nights, or one capture every 93 trap-nights; a reasonably high success rate for such an elusive cat and a remarkably consistent rate compared to 2012.

Snow leopard range use and capture success – Preliminary examination of camera-trap and telemetry results suggest that territorial snow leopards in Wakhan display a consistent scent marking routine. It renders to some extent their scent-marking utilization of the landscape predictable in time, with a territorial male visiting the same scent marking site every 2-3 weeks (Simms, pers. comm.). As a consequence, and from a practical point of view, a capture is therefore most likely to occur within days in the absence of fresh evidence of presence. In Pagish and Sarkand valleys, tracks of latest presence of snow leopards were older than 10 days when we started installing snares, based on preliminary investigations of the snow leopard tracking team. Captures happened 8 and 4 nights after snare deployment. The absence of fresh tracks in a snow leopard area selected for trap deployment is therefore not indicative of a higher likelihood of failure.

Capture time – It is worth point out that one (20%) out of five snow leopard captures in Wakhan occurred in the early morning between 5:00 and 6:00 am (for the female in Pagish). In Mongolia, Johansson et al. (2013), using the same capture method, reported that only 3% of captures occurred during day time. Hopefully a larger sample size in Wakhan will help demonstrate whether there is a significant difference between these two sites.

Drug combination - The tiletamine-zolazepam combination we used in two males in 2012 worked fine but produced relatively rough recoveries. In comparison, the ketamine-medetomidine combination we used for the female last year and for the two specimens captured during the present mission allowed us to use atipamezole as a partial antagonist, thus bringing the animal to physiological normalcy faster. In addition, medetomidine considerably hastens and smoothes recovery which for snow leopards is particularly appreciable as it decreases the risk of the animal moving into its steep and dangerous rocky habitat when still uncoordinated. For this reason we prefer the ketamine-medetomidine combination. The main limitation to the use of this combination is that ketamine needs to remain refrigerated until it is used (we kept ketamine in a high quality

cool-box with ‘ice-packs’ cooled daily and refrigerated at 7-8 C). In several countries ketamine is rarely used due to restricted usage and importation laws.

Recovery - During the recovery time that follows the administration of the reversal drug, it is important to monitor the animal continuously from a distance >10 meters. Careful monitoring is highly recommended until the animal is able to withstand sternal recumbency, but after this stage, it is advised to leave the area. We have noticed that at this later stage of recovery, noise and light stimulation result in premature walking attempts by a still largely uncoordinated snow leopard, which increase the risk of dangerous falls when going into steep areas. We therefore recommend letting the snow leopard recover from sternal recumbency to ambulatory stage without the presence of an observer, who invariably will act as a stimulus to the leopard and contribute to a premature recovery. In conclusion the capture team should leave the area as soon as the reversal drug is injected and the one person left on site to monitor the recovery process should also leave the area as soon as possible after sternal recumbency by the animal is achieved. Attempts to direct the moving animal towards a wanted direction is hazardous, usually inefficacious and can even be counter-productive.

Possible re-capture – In the event of the possibility of a recapture, it is always recommended to compare the phenotype of the captured “new” snow leopard versus those of previously captured individuals, even when no microchip is detected.

Plate 3. The snow leopard team with the community leader of Sarkand Village (far right) around the anesthetized recaptured male snow leopard, "Khani Wakhani", (his eyes are covered to protect them from dust and flash lights), 25 September 2013, Sarkand Valley, Wakhan District, and Badakhshan Province, Afghanistan.

Conclusions

The WCS snow leopard team successfully captured, radio-collared and released an adult female and an adult male snow leopard on the 17th and 25th of September respectively, in Pagish and Sarkand valleys of Wakhan Hindu Kush. Both individuals were measured, fitted with gps-satellite collars, and sampled for DNA. These healthy snow leopards recovered quickly from tranquilization and headed up the Hindu Kush Mountains where to date they have been doing well. These two specimens will be tracked remotely until October 2014 to better understand their behavior and range use. The capture team was composed of five to six Afghans assisted by two foreign experts. For the last two years efforts have been made to build the capacity of Afghans in the field of wildlife immobilization and telemetry studies. Additional Afghan candidates, including 2 local paravets, 2 rangers, and 2 wildlife veterinarians from Kabul zoo have been pre-selected for similar capacity building and training in 2014.

Literature Cited

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