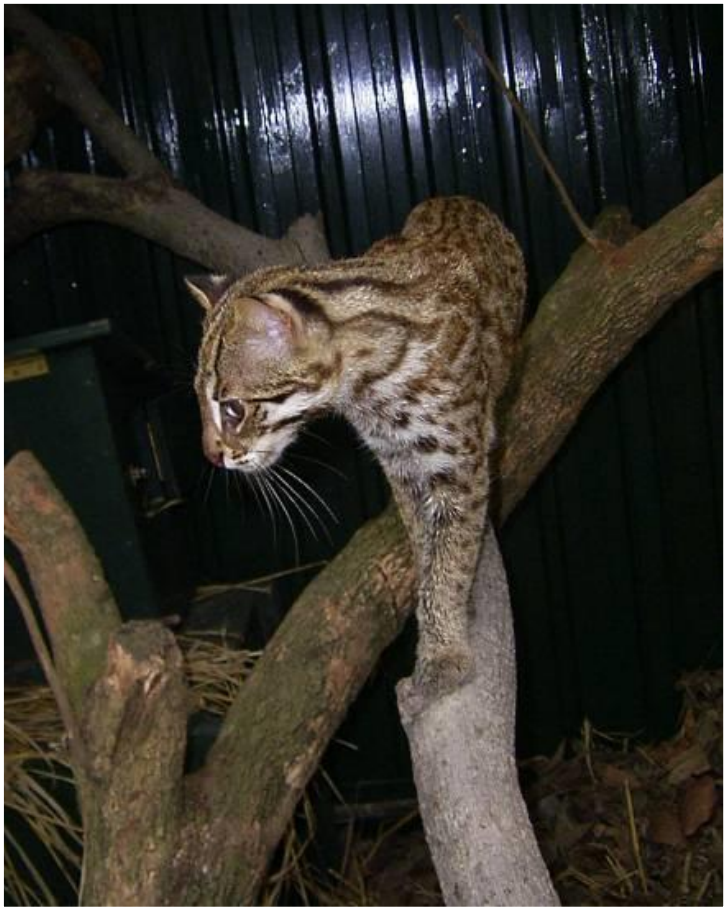
Post Release Survival Monitoring of a Rehabilitated Leopard Cat (*Prionailurus bengalensis*) in Hong Kong SAR China



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Summary

A juvenile female Leopard Cat (*Prionailurus bengalensis*) was rescued by the Agriculture, Fisheries and Conservation Department (AFCD) after its discovery trapped within a water catchment in Fanling, New Territories on 29th June 2009. After 11 months of rehabilitation at Kadoorie Farm and Botanic Garden (KFBG) Wild Animal Rescue Centre (WARC) followed by acclimatization in a pre-release enclosure for 2 weeks, the 2.8kg cat was fitted with a 29g radio telemetry collar with mortality sensor (BioTrack TW-5) to facilitate post release monitoring.

The cat release occurred in sub-tropical secondary forest on the slopes of the mountain Kwun Yum Sham, at 200m ASL. The pre-release enclosure was remotely opened to allow the animal to choose when to leave. Radio telemetry results for the following 13 days indicated that the cat remained within a 0.36km radius of the release point. The study team failed to receive any radio signal from the 14th day onward despite an extensive search effort and the status of the animal after this date remained unknown.

Introduction

In line with world best practice in wildlife rescue, rehabilitation and release, post release monitoring is indicated as an essential goal for professional rehabilitation facilities (RSPCA 2010), (IUCN/SSC 2013). Release of rehabilitated carnivores into the wild faces many difficulties and has been covered in numerous publications on post release survival of mammals. As a top predator in the food chain population densities of leopard cats are normally low and competition for territory and prey may be high (Mohamed *et al.* 2013). Large numbers of captive-bred and wild caught animals of different species are released into the wild annually, often as part of global conservation or translocation strategies (e.g. Wolf *et al*.1996, Mathews *et al.* 2005, 2006, Maran *et al.* 2009, Peters *et al.* 2009, Pinter-Wollman *et al.* 2009). It has generally been reported that reintroduction of captive-bred animals and translocation of wild-caught animals into the wild have had low levels of success (Beck *et al.* 1994, Ginsberg 1994, Mathews *et al.* 2005, Jule *et al.* 2008). Translocations of wild-caught animals are considered more likely to succeed than releasing captive-bred animals (Griffith *et al.* 1989). Another review of post release survival studies suggested an increase in the number of studies in which the population was self-sustaining (Wolf *et al.* 1996), with 53% of release programmes involving endangered or threatened avian and mammalian species being described as successful.

The aim of this study was to gather release data in order to aid decision making for future release plans and to develop effective guidelines. Without such data gathering, rescue centres may continue to put resources into failing processes or ventures and may also contribute to suffering of released wildlife when there is failure to adapt adequately to the new wild environment.

On 24th June 2009 the Wild Animal Rescue Centre received a juvenile female Leopard Cat from the Agriculture Fisheries and Conservation Department (AFCD) after it was rescued from a water catchment in rural Fanling (Latitude**:** 22° 29' 30.48" N Longitude**:** 114° 08' 29.40" E), central New Territories. The juvenile cat was estimated to be approximately 4 months old and weighed 0.85kg. Although the animal showed minor signs of dehydration, it was in good physical condition. It was maintained in the animal rescue centre for care and close observation for the first month, and human contact was kept to a minimum.

As the animal was in good health and readily accepted solid food being offered, the project team decided to move ahead with the rehabilitation and release preparation process and moved the cat into an outdoor enclosure on 21st July 2009. The enclosure was furnished with climbing branches, multiple hides and natural substrate in order to enrich and encourage natural behaviours. The subject continued to develop and increase its appetite, doubling its weight in two months to 1.3kg. Meanwhile courses of rabies and feline vaccines (NOBIVAC® TRICAT TRIO) were administered to the Leopard Cat.

Methods

The study was conducted in the central New Territories of the Hong Kong SAR, China (22.4329° N, 114.1171° E). The cat release took place in secondary forest on the northern slopes of Kwun Yum Shan at 200m asl. The climate in Hong Kong is influenced by seasonal monsoons with two distinct seasons a wet season from April to September and dry season from October to March.

Telemetry Equipment

An internal powered radio transmitter (BioTrack Ltd. TW-5) with mortality sensor on a collar mount was fitted to be used with a compatible hand held 3 element antennae (Communication Specialists R1000). The

estimated battery life of the transmitter was over 200 days based on manufacturer's specifications, the full collar and transmitter package weighed 29g (Photo 1 and 2). The in-built mortality sensor was programmed to switch into "mortality mode" if the subject remained motionless for 12 hours or more, once activated, the transmitter then emits a different signal audible through the radio receiver. The sensor reverts to normal mode should the subject move again. The nylon collar was customized with a break-away link made with stitched cotton treads (Photo 3). This design aimed to allow temporary anchorage for the collar but with the intention of a break away when the threads were worn down or degraded as a result of weathering and the animal's activity.

Pre-release Acclimatization

The animal was in good overall condition and showed natural instinct to avoid human contact. All signs indicated the animal was fit for wild release. On 19th March 2010, weighing 2.8kg, the animal was sedated to enable thorough health examination and the radio collar was fitted to the cat's neck dimensions. On 24th May 2010, the cat was transferred into a soft release enclosure (Photo 4) to acclimatize at its release site location. Pre-killed whole prey items where offered daily allowing the animal to reach optimal physical condition prior to release. Wild Masked Palm Civet (*Paguma larvata*), East Asian Porcupine (*Hystrix brachyura*) and Leopard Cat (*Prionailurus bengalensis*) visited the cage during the evenings and were photographed by camera traps. No unusual behaviour was observed from the animal toward the collar during the acclimatization period.

Results

Release and Tracking

On 7th June 2010 after a period of just over 11 months in rehabilitation and pre-release acclimatization, the cage door was opened and the animal exited during the first night. On day one (D+1, Map 1), the transmitter signal was located by triangulation within dense bush 5-10m behind the rescue centre facilities adjacent to where it had spent most of the past year and approximately 125m through dense bush and secondary forest from the location of the hack cage site where it was released.

For the following 11 days an attempt was made to locate the collar signal daily and the results indicated that the cat remained within a 0.36km radius of the release point. Activity occurred only during the night time with no movement recorded during the daylight hours. On the morning of the 13th day (D+13, Map 1) the cat was tracked to an isolated stand of grass and shrubs on disused agricultural terraces. The search flushed the cat which travelled up hill and the location was confirmed again that afternoon. On the 14th day the signal could not be located and all subsequent efforts to recover the signal failed. Irregular signal searches continued in a widening search field until it was concluded that the battery was exhausted 170 days after the release on 23 November 2010. Signal searches covered a radius of up to 5km from the point of release and included several key mountain look-out points giving maximum opportunity to recover the signal. However, no further signals were recovered.

Discussion

The initial 13 days survival and movement suggest that the leopard cat was finding adequate food and water however, the period was a little short to attach any confidence regarding the cat's long-term survival. On day 13 the animal was visually seen to be alert, energetic and highly mobile which suggests it was successfully managing to obtain at least some of its nutritional and hydration requirements.

We speculate that the animal continued to survive and the inability to locate a signal was due to transmitter failure. In case of death, a mortality signal should have been discovered at some point. Another possible theory is that the animal travelled over 10km beyond our ability to pick up the signal between D+13 and D+14 however this seems unlikely given the pattern of movement from D+1 to D+13.

The results of this study suggest that although long term survival was probable for the juvenile leopard cat reared in captivity without natural parental support or guidance, the short period of tracking could not provide conclusive evidence for the prediction. One published source (Scottish Wildcat Haven) has suggested that to confirm survival post release a minimum of 60 days should be used as a benchmark and to fully confirm post release survival the animal should be tracked through a full season cycle to demonstrate its ability to cope with all seasonal weather conditions. Further tracking studies will be required to determine whether rescue interventions and short term captive care and rehabilitation have lasting effects on survivorship of leopard cats following soft release programmes.

Acknowledgment

The HKSAR Government's Agriculture Fisheries and Conservation Department (AFCD) approved the telemetry study under the license of the KFBG wildlife rescue centre, staff members including Tan Kit Sun, Crystal Chan, Eric Lee and Dr. Alessandro Grioni provided assistance with animal care and subsequent release and tracking.

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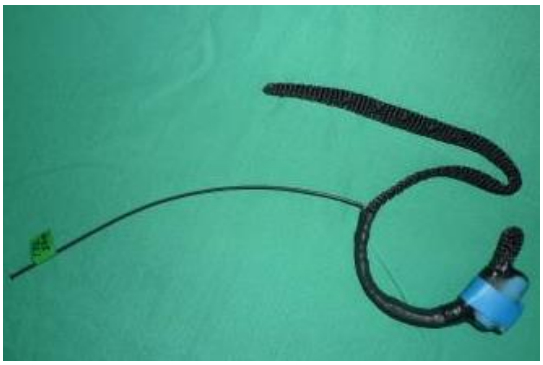


Photo 1. Collar and radio transmitter package.

Photo 2. Collar fitted with suitable slack around the neck.

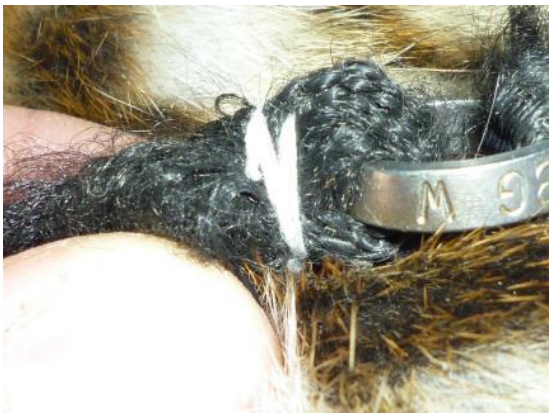
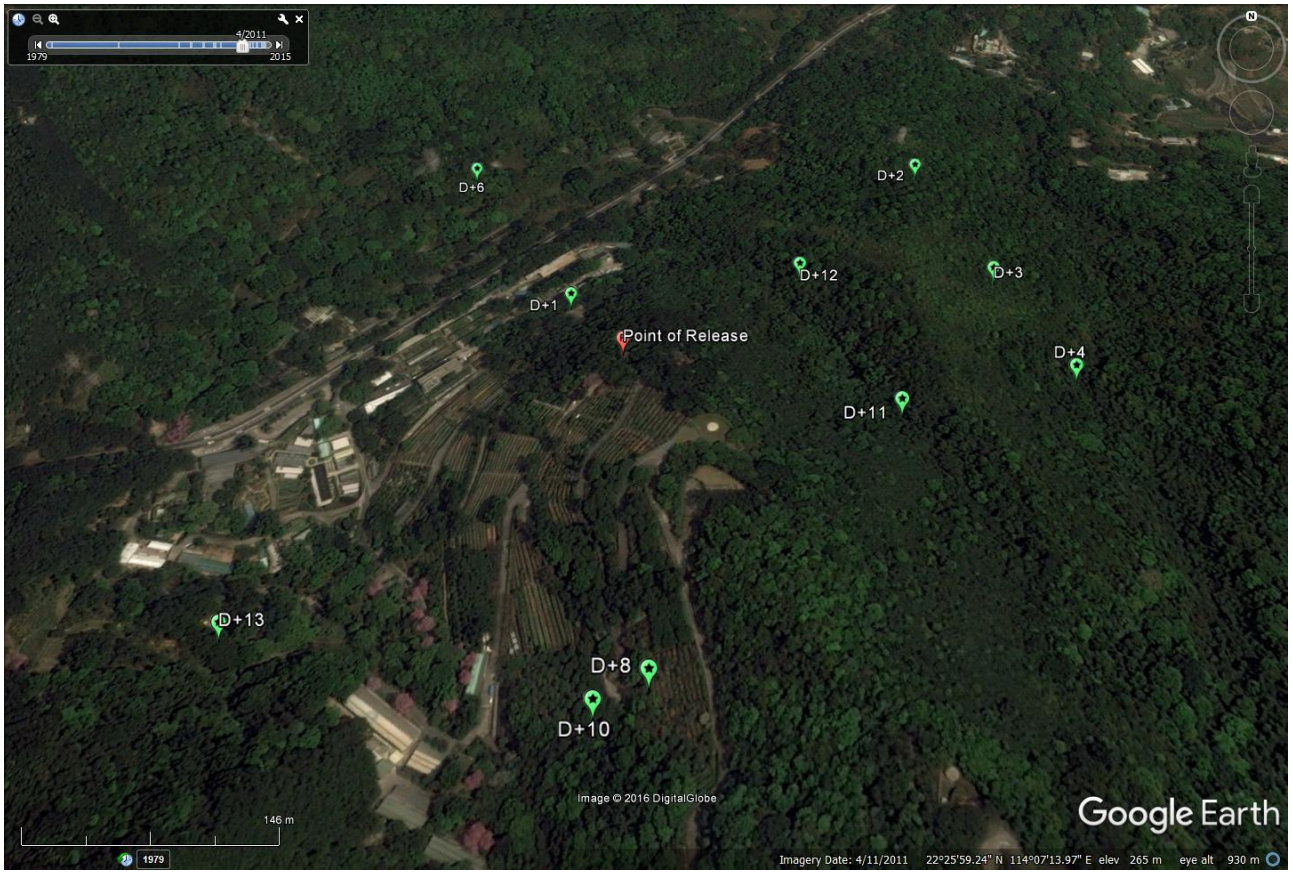


Photo 3. The break-away link created with cotton thread.

Photo 4. The soft release enclosure in natural habitat

Photo 5. Other predatory mammals visited the hack cage during the acclimatization period. Masked Palm Civet (left), Leopard Cat (middle). An East Asian Porcupine visited the cage on the release evening (right),



Map 1. From Day 1 to Day 13, the leopard cat remained within a 0.36km radius of the release point.

End