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TRANSLOCATION OF A CAPTIVE-RAISED LEOPARD CAT *(PRIONAILURUS BENGALENSIS)* IN NORTH CENTRAL THAILAND

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ABSTRACT

We radio-tracked a translocated, captive-raised female leopard cat *Prionailurus bengalensis* in Phu Khieo Wildlife Sanctuary, Thailand. Based on the 95% minimum convex polygon home range estimator, the post-release range was 9.8 km^2 and overlapped the ranges of 12 other wild radio-collared leopard cats. This leopard cat survived at least 5 months prior to radio-collar failure. We believe that future translocations of captive-raised small felids may be successful because of intrinsic hunting and survival behavior characterized by small felids. However, translocations should be planned according to the guidelines set forth by the World Conservation Union (IUCN) Reintroduction Specialist Group.

Key words: captive-raised, leopard cat, *Prionailurus bengalensis*, Thailand, translocation

INTRODUCTION

Translocations of captive-raised carnivores are often difficult and have a low degree of success (YALDEN, 1993; NOWELL & JACKSON, 1996; READING & CLARK, 1996; IUCN, 1998). Survival skills (i.e., hunting, danger avoidance, and intraspecific interactions) learned through reinforcement as wild juveniles are difficult to develop under captive conditions (HENSHAW *ET AL.*, 1979; MILLS, 1991; YALDEN, 1993). This problem is increased when translocating large carnivores. Large carnivores that are released in the wild without adequate survival training often die or become predators of livestock (VAN DYK, 1991; NOWELL & JACKSON, 1996). In contrast, small carnivores such as feral cats *Felis silvestris catus* and European wildcats *F. s. silvestris* may be better suited for captive releases because of their low profile, flexible diet, and intrinsic survival skills requiring little or no previous reinforcement training (BUTTNER & WOREL, 1990; SUNQUIST & SUNQUIST, 2002).

As part of a larger carnivore community study (GRASSMAN, 2004), we radio-tracked a translocated captive-raised leopard cat *Prionailurus bengalensis* in Phu Khieo Wildlife Sanctuary, Thailand (PKWS). Our objective was to conduct the first post-release monitoring of a translocated leopard cat to provide insights that would help guide future small felid translocations.

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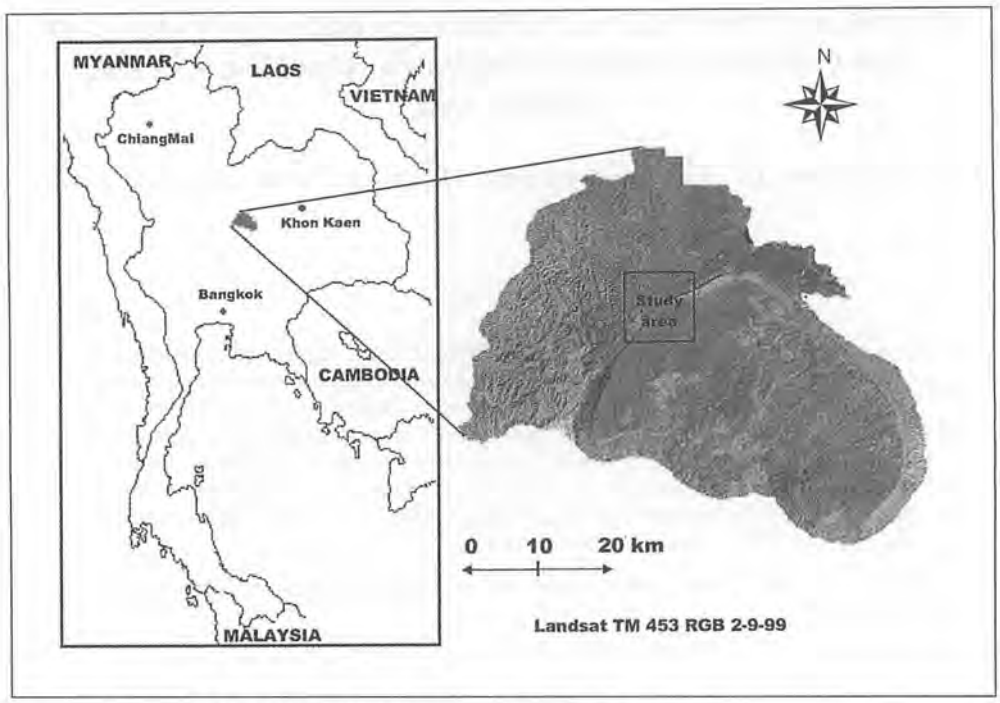

Figure 1. Location of Phu Khieo Wildlife Sanctuary, Chaiyaphum Province.

STUDY AREA

Phu Khieo Wildlife Sanctuary is situated in Chayaphum Province (lat. 16° 5'–16° 35' N, long., 101° 20'–101° 55' E) in north central Thailand (Fig. 1). Established in 1979, PKWS encompasses 1,560 km^2 of forests within the larger 4,550 km^2 Phetchabun Forest Complex. The sanctuary is dominated by a mixed evergreen forested plateau between 700–1,100 m elevation. Topography consists primarily of forested hills rising westward into mountains. The subtropical forest consists of dry and hill evergreen (82%), mixed deciduous (14%), and dry dipterocarp (4%) species (KUMSUK *ET AL.*, 1999).

The climate of PKWS is strongly influenced by the seasonal monsoons. There are two distinct seasons: wet season (June to October) and dry season (November to May). Mean annual precipitation is 140 cm, with 90% occurring during June through September (KUMSUK *ET AL.*, 1999). Annual mean temperature is 21°C (range –3 to 37°C). Wet and dry season mean temperatures are 23°C and 18°C, respectively.

The study area was in the north central portion of the sanctuary around the Thung Kra Mon Headquarters. Encompassing approximately 100 km^2, the study area consisted of forested hills, 3 permanent reservoirs, and a 3-km^2 grassland area. The main park road, smaller trails, and several permanent streams were included within the area.

METHODS

A subadult female leopard cat (2.4 kg) was presented to us by the Royal Forest Department of Thailand (RFD) on 12 July 2001, with the request that we release the cat in PKWS. The leopard cat was confiscated by the RFD from a villager in Ban Khampum, Sakhon Nakhon Province. The villager originally purchased it as a kitten from a local hunter during May 2000. The kitten was captured in the surrounding forest when it was about 2 months of age based on the physical description given by the owner. The leopard cat spent the subsequent 14 months in a 1 x 1 x 1.3-m enclosure until confiscated. The individual was not domesticated because it never tolerated touching, petting, or any other stimulus from humans. It was not allowed outside of its cage, never came into contact with other animals, and was not allowed the opportunity to kill prey. Diet consisted of raw beef and chicken fed about every 2 days.

Upon receipt of this leopard cat in PKWS, we anesthetized it with Zoletil® (tiletamine/zolazepam hydrochloride; Virbac, Ltd., Carros, France) at 5 mg/kg (GRASSMAN *ET AL.*,2004). Physical parameters were recorded and a 55-g radio-collar was attached. After consultation with a veterinarian, blood was not drawn for viral screening because the leopard cat never received vaccinations and was never in contact with domestic cats (M. KUMSUK, personal communication). The leopard cat was transferred to a 0.5 x 0.5 x 1.5-m enclosure for 2 days to recover from transportation and immobilization. During this time it was fed raw chicken and kept under a shelter.

After recovery the leopard cat was placed under quarantine in an abandoned primate enclosure (4 x 10 x 5 m) in a forested area near the Thung Kra Mon Headquarters in PKWS. This individual was fed live frogs and chickens for 1 month. Enrichment activity such as suspending prey from the cage ceiling and hiding prey under logs was undertaken periodically. Observations of stalking, pouncing, and killing behavior were noted and recorded by video.

On 11 August 2001 the leopard cat was released in a hill evergreen forest 800 m from the sanctuary road and 2.2 km from the nearest human habitation (Thung Kra Mon Headquarters). Shelter and food were left at the release site for 1 week post-release. The site was chosen based on the high frequency of use by other wild radio-collared leopard cats (GRASSMAN, 2004). The release site was about 230 km from the area this leopard cat was originally captured.

Radio-tracking occurred primarily on the ground, with either a hand-held 3-element antenna, or a large vehicle-mounted null antenna (KENWARD, 2001). Hilltop stations were frequently used for establishing initial bearings when a radio signal could not be received at lower elevations. Radio telemetry error was assessed with a global positioning system (GPS) by identifying the location of 20 radio transmitters hidden within the forest (BLANKENSHIP, 2000; KENWARD, 2001). Distances between the hidden transmitter and receiver were at least 1 km. Mean distance between triangulated locations and GPS locations indicated a mean triangulation error of 68 m (N = 20, SD = ± 62, range 12–225).

Spatial patterns.—The leopard cat was radio-tracked during nocturnal and diurnal periods, and we attempted to locate it a minimum of 3 times/week. Independence of locations was assumed by using only 1 location during each 24-h period. Leopard cat locations were determined using the LOAS® (Ecological Software Solutions, Inc.,

Sacramento, California) software program. A cumulative range size was created using the 95% minimum convex polygon (MCP) method (MOHR, 1947) with the Animal Movement Extension (HOOGE & EICHENLAUB, 2000) of Arc View® (version 3.2, Environmental Systems Research Institute, Inc., Redlands, California). Overlap comparisons between the released individual and other radio-collared leopard cats was estimated using the 95% MCP estimator of the cumulative ranges. Daily movement was calculated by measuring the linear distance between consecutive daily locations (RABINOWITZ, 1989; BAILEY, 1993) taken 24-36-h from the previous day location. Because of varying topography and a non-linear route traveled by this leopard cat the actual distances covered between consecutive days were greater than estimated (BAILEY, 1974).

Activity patterns.—Activity levels were recorded intermittently during a 24-h diel. We assumed that 15 minutes satisfied independence of observation between each activity observation (RABINOWITZ & NOTTINGHAM, 1986; CRAWSHAW & QUIGLEY, 1991).

RESULTS

The leopard cat was in excellent physical condition when first examined, and the dentition was complete with no damage. It had little difficulty in catching, killing, and eating the prey provided while in quarantine. Additionally, the radio-collar did not seem to affect behavior.

Based on radio telemetry data, this leopard cat occupied a home range of 9.8 km^2 (N = 52 locations) during a period at least 5 months. Repeated attempts to locate its radio signal after 19 January 2002 were unsuccessful likely because of radio-collar failure. Range of the released leopard cat overlapped the ranges of 12 other radio-collared leopard cats (8 males, 4 females), with a mean overlap percentage of 43% (Fig. 2). Fifty percent of this individuals locations were clustered within a small, 0.9-km^2 core area; about half the size of other radio-collared female leopard cats (GRASSMAN, 2004). Mean daily movement was 1.1 km (N = 17). Overall activity was 52%, with peak activity occurring during 0600 h and 1900 h.

DISCUSSION

Translocated animals should be taxonomically and genetically similar to the receiving population (YALDEN, 1993; NOWELL & JACKSON, 1996; IUCN, 1998). The physical measurements and coat pattern of this cat were similar to leopard cats at PKWS (GRASSMAN, 2004). The relatively robust populations of leopard cat in Thailand (GRASSMAN, 2004) probably allows for high within population genetic diversity and reduces differentiation of the metapopulation (AVISE, 1994). The translocated and PKWS leopard cats are likely genetically similar because of the relatively short distance between the populations, and probable reduction of genetic differentiation.

Success of this translocation may have been related to the high intrasexual home range overlap exhibited by other leopard cats in PKWS (Fig. 2; GRASSMAN, 2004). The apparent lack of territoriality by leopard cats in PKWS may benefit the introduction of a conspecific due to a low level or absence of antagonistic behavior.

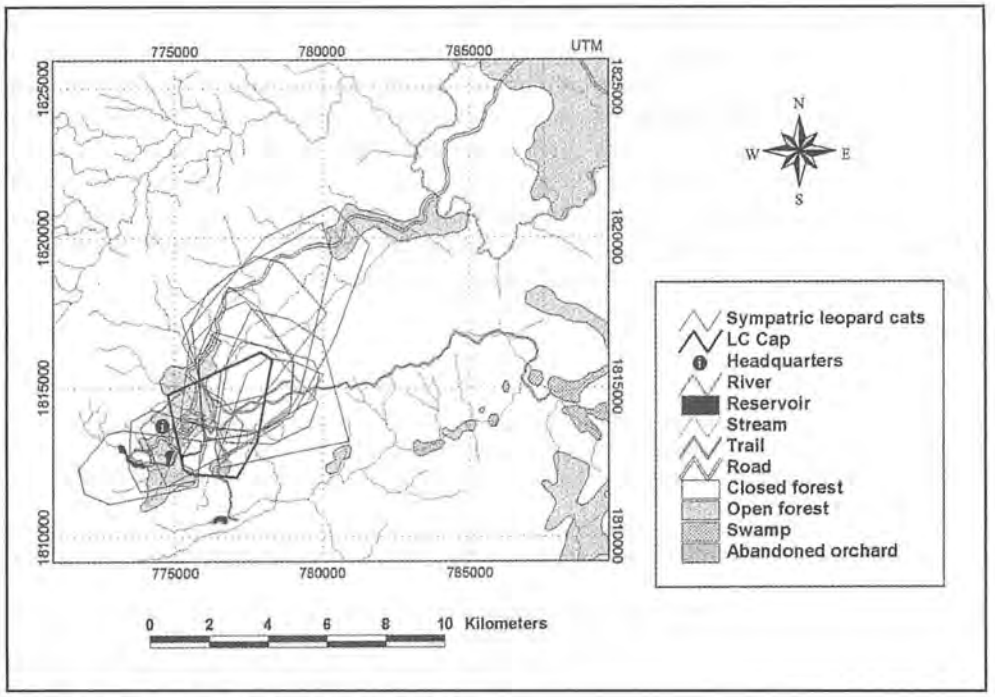

Figure 2. The study area in Phu Khieo Wildlife Sanctuary.

Survival of the translocated leopard cat after 5 months post-release suggests that other captive-raised leopard cats and other captive-raised small cat species may successfully be translocated in the wild. Captive-bred European wildcats have been successfully translocated in Germany (BUTTNER & WOREL, 1990). This study should be viewed as a preliminary model for further research into small felid translocations.

The translocation of this leopard cat was directed by the RFD primarily for the welfare of the individual rather than the leopard cat population. Because this leopard cat was to be released regardless of scientific or conservation merit, we believe that our pre- and post-release treatment and monitoring was beneficial and provided data for future small felid translocations. The IUCN Guidelines for Reintroductions (IUCN, 1998) list factors that need to be addressed prior to a translocation. These factors included awareness of the taxonomic status, living requirements, current physical health, captive survival training, and adequate post-release monitoring. We addressed these requirements during this translocation, and other potential translocations also should incorporate these guidelines.

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