**Short Communication**

# First Photographic Evidence of Flat-Headed Cats (*Prionailurus planiceps*) in Pasoh Forest Reserve, Peninsular Malaysia

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**Abstract**

The flat-headed cat *Prionailurus planiceps* is the smallest wild felid in Southeast Asia. Currently it is thought to be patchily distributed throughout Sumatra, Borneo, Peninsular Malaysia, and Thailand. Conclusive information on the species distribution, populations, and ecology is largely missing due to the lack of species detection. Here we report the first photographic evidence of flat-headed cats in Pasoh Forest Reserve, and second ever in Peninsular Malaysia. Two individuals moving together during daytime in lowland dipterocarp forest far from water bodies and near an oil palm plantation were photographed. The capture took place in June 2013 with a camera trap located at a height of 10 cm above the ground. Besides adding important information on the species' potential distribution and ecological ranges, we speculate that flat-headed cat ecology and the height of camera traps could be important factors why the species escapes detection.

***Keywords***: flat-headed cat, Pasoh Forest Reserve, camera trap, camera trap placement

Resumen

El gato de cabeza plana *Prionailurus planiceps* es el más pequeño de los gatos salvajes en el sureste de Asia. En la actualidad se cree que el gato de cabeza plana tiene una distribución parcheada en partes de Sumatra, Borneo, Malasia peninsular, y Tailandia. Existe poca información conclusiva sobre la distribución de la especie, sus poblaciones y su ecología debido a la falta de detecciones. En esta nota describimos la primera evidencia fotográfica de gato de cabeza plana en la Reserva Forestal de Pasoh, y la segunda detección hasta ahora en Malasia peninsular. Nuestra cámara detectó dos gatos de cabeza plana moviéndose juntos durante el día en bosque bajo de dipterocarpa, lejos de cuerpos de agua y cerca de una plantación de palma de aceite. La captura occurrió en junio de 2013, con una cámara situada a 10 cm sobre el suelo. Además de contribuir información importante sobre el rango ecológico y de distribución de la especie, especulamos que la ecología del gato de cabeza plana y la altura a la que se colocan las cámaras podrían ser factores importantes por los que la especie no es detectada mas frequentemente.

Palabras clave: gato de cabeza plana, Reserva Forestal Pasoh. camara trampa, colocación camaras trampa

Received: 11 November 2013; Accepted 8 March 2014; Published: 23 June 2014



Cite this paper as: Wadey, J., Fletcher, C. and Campos-Arceiz, A. 2014. First Photographic Evidence of Flat-Headed Cats (*Prionailurus planiceps*) in Pasoh Forest Reserve, Peninsular Malaysia**.** *Tropical Conservation Science* Vol.7 (2): 171-177. Available online: www.tropicalconservationscience.org

## Introduction

The flat-headed cat *Prionailurus planiceps* is one of the least understood felid species [1, Fig 1]. In 2008, the species was listed on the IUCN Red List as endangered [2]. Few reliable sources are available on the species' historical and current distribution, and even less is known about its ecology and behavior. The current flat-headed cat range is speculated to include Borneo, Sumatra, Peninsular Malaysia, Thailand, and perhaps southern Myanmar [1-5]. Due to the lack of species-specific field studies, detections have come from visual sightings and the rare by-catch from camera trap studies (Fig 1).

A study carried out between 1968 and 1974 [6] recorded that a flat-headed cat had been captured by indigenous people within Pasoh Forest Reserve, in central Peninsular Malaysia. Pasoh's fauna was extensively researched and several other mammalian studies were conducted afterward [7], but there was no further record of this felid species. In recent decades Pasoh has lost many of its large vertebrates, becoming a defaunated ecosystem in which the largest remaining carnivores are the leopard *Panthera pardus*, sun bear *Helarctos malayanus*, and dhole *Cuon alpinus*, all of them probably occurring at very low densities [8]. Increased accessibility from surrounding plantations has presumably contributed to the current strong encroachment and poaching pressure. Here we report the camera trap detection of two flat-headed cats moving together during daytime in Pasoh Forest Reserve in June 2013.

**Fig 1. Image of captive flat-headed cat. Photocredit Jim Sanderson: http://en.wikipedia.org/wiki/Flat-headed_cat.**

## Methods

Pasoh Forest Reserve, located 70 km southeast from Kuala Lumpur (2º98'N 102º31'E), is essentially an elongated '*forested island*' of approximately 140 km$^2$ surrounded by oil palm and rubber plantations. Most of Pasoh is regenerating secondary forest from timber harvesting in the 1950s, with continual selective logging to the present [9-10]. Pasoh's vegetation mainly consists of hill dipterocarp forest, though the south harbors a small patch of around 6 km$^2$ of lowland dipterocarp forest that remains relatively undisturbed (Fig 2). Pasoh contains limited year-round freshwater streams, and the mean annual rainfall is less than 2,000 mm, among the driest in Peninsular Malaysia.

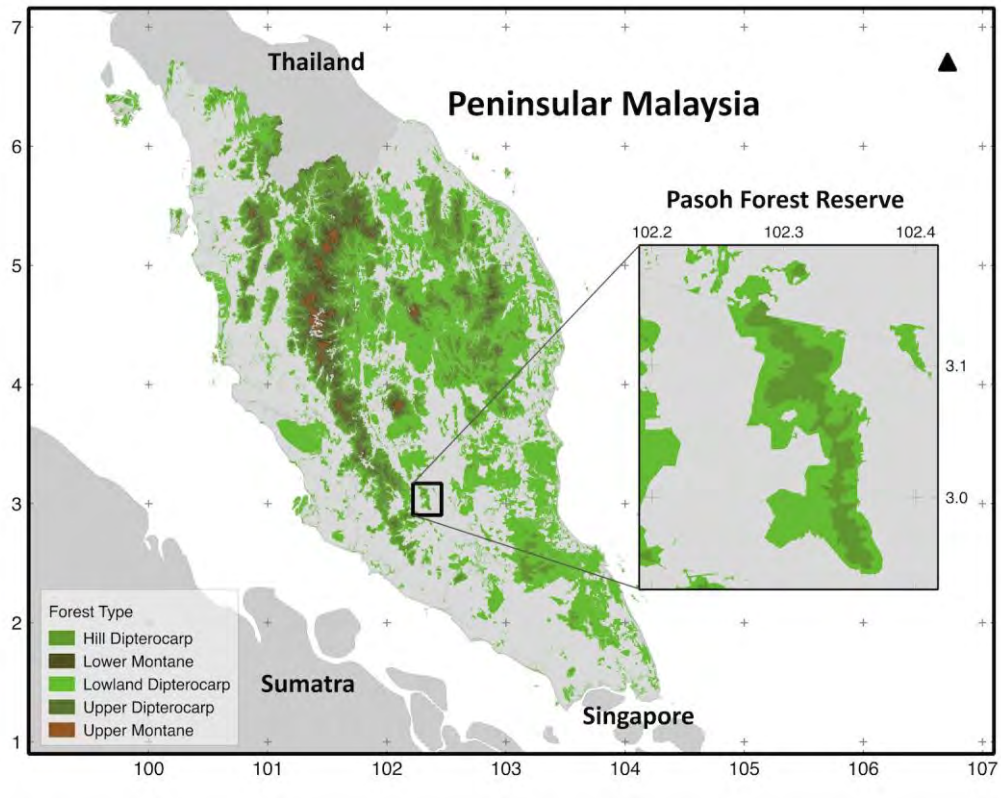


**Fig 2. Map of Pasoh Forest Reserve in relation to Peninsular Malaysia.**

The flat-headed cat detection reported in this short communication is part of a large-scale camera trapping project conducted by the Tropical Ecology Assessment Monitoring network (TEAM, http://www.teamnetwork.org).

Pasoh Forest Reserve is one of 17 sites across Latin America, Asia and Africa under the TEAM standardized protocol [11]. TEAM's pan-tropical standardized protocol is to: (1) monitor tropical vertebrate communities; (2) track changes in these communities; and (3) uncover any drivers behind these changes, using a camera trapping framework [12]. Camera trap locations are one-camera stations in a regular grid framework, at a density of one station per 2 $km^2$ with 60 stations per study site [11]. The cameras are placed to capture as many species as possible; Reconyx PC900 cameras are deployed close to animal trails and set at a height of 30-40 cm above the ground [11]. TEAM cameras operate 24h a day and are deployed in the field for a period of 30 days, always during the dry season.

## Results

Here we report the photo-capture of flat-headed cats in one of our cameras. The flat-headed cat detection site was surveyed for 30 camera-trap-nights and yielded a total of 457 photograph captures (Table 1). Including the flat-headed cat, we recorded a total of 18 independent detections from eight different vertebrate species. The two species with the highest number of independent captures were the southern pig-tailed macaque *Macaca nemestrina* with six independent detections, and the lesser mousedeer *Tragulus kanchil*, four independent detections (Table 1). We recorded an independent detection of two flat-headed cat individuals traveling together (Table 1, Fig 3). Other species detected at the location are the rail-babbler

*Eupetes macrocerus*, monitor lizard *Varanus salvator*, common shrew *Tupaia glis*, black-capped babbler *Pellorneum capistratum* and long tailed rat *Leopoldamys sabanus* (Table 1). We also documented footprints of Malayan tapir *Tapirus indicus*, wild boar *Sus scrofa,* and tree markings of sun bear *Helarctos malayanus* near the location of the camera-trap.

**Table 1**. Species captured photographically at the flat-headed cat detection site. Location is in lowland tropical forest in Pasoh Forest Reserve, Peninsular Malaysia. All independent detections contained one individual with exception of the flat-headed cat with two individuals and the southern pig-tailed macaque ranging in troop size from 3–14 individuals.

| Species | Common Name | Independent Detections | Number of Photos |
|---|---|---|---|
| ***Eupetes macrocerus*** | Rail-babbler | 1 | 3 |
| ***Leopoldamys sabanus*** | Long-tailed giant rat | 1 | 7 |
| ***Macaca nemestrina*** | Southern pig-tailed macaque | 6 | 374 |
| ***Pellorneum capistratum*** | Black-capped babbler | 2 | 26 |
| ***Prionailurus planiceps*** | Flat-headed Cat | 1 | 23 |
| ***Tragulus kanchil*** | Lesser mousedeer | 4 | 16 |
| ***Tupaia glis*** | Common treeshrew | 2 | 5 |
| ***Varanus salvator*** | Monitor lizard | 1 | 3 |
| **Total** | | 18 | 457 |

The detection of the two flat-headed cats took place at 0914 on the 26th of June 2013, in the south of Pasoh, in lowland dipterocarp forest. When the flat-headed cats were detected, the camera trap had been moved by southern pig-tailed macaques, which reduced its height from 40 to just ~ 10 cm above the forest floor. The detection site is ~1.5km from an oil palm plantation. No lakes or major rivers – features used as predictors for the species' distribution [10] – flow close to the detection site. Small fresh water streams and waterlogged soils do occur, but in low numbers and sparsely distributed. The detection took place in the dry season, when most streams and waterlogged soils have dried up. The camera placement was on a small animal trail that bisects a dried-up stream.

## Discussion

The detection of flat-headed cats in Pasoh brings up several points for re-discussion about: (1) habitat range; (2) ability to persist in human-dominated surroundings; and (3) height and placement of camera traps [1].

First, with little conclusive information on historic and current range and distribution, previous studies [1] have inadvertently limited the species' distribution to major rivers and large lakes. As Pasoh contains no major rivers or lakes and is generally covered by hill dipterocarp forest, this detection provides new evidence of the species' potential habitat range – indeed Pasoh ranks as low probability of occurrence in a previously published species distribution model [1].

Second, Pasoh's surrounding landscape is dominated by plantations that have been established since the 1970s. The detection, occurring close to oil palm plantations, suggests that the flat-headed cat is more tolerant of changes in its surrounding environment than previously assumed. Indeed, previous detections of flat-headed cats in Peninsular Malaysia occurred in Selangor peat swamp forest, Pahang peat swamp forest,

and Krau Wildlife Reserve [1], all forest blocks of more than 600 km$^2$. Pasoh is only a quarter of that size, indicating that this felid species may occur in smaller forest fragments than initially thought.


**Fig 3. Composite of three camera trap images of one of the flat-headed cats detected in Pasoh Forest Reserve, Peninsular Malaysia, in June 2013, showing details of ear shape and tail. Photo credit: Tropical Ecological Assessment and Monitoring Network (TEAM).**

Third, why has so little information about flat-headed cats been gained as by-catch information from the many other felid camera trap studies in the region? We speculate it could be due to the differences in ecological requirements, which do not align with current camera placements. It is plausible that the flat-headed cat differs from large felids in transversing its habitat through undergrowth and on small trails. Most felid and mammal studies within the flat-headed cat range set cameras on large animal trails, decreasing capture probability and increasing sampling bias. Furthermore, current camera traps for felid studies (e.g. for tigers *Panthera tigris*) are probably set too high [13] for the detection of flat-headed cats. In many instances, this small felid could escape detection by simply passing under the camera.

To increase capture probability and decrease sampling bias for the flat-headed cat, we suggest species-specific studies, placing camera traps close to ground level and along small animal trails rather than on old logging roads or regularly used trails.

## Implications for conservation

This study reports the first photographic evidence of flat-headed cats in Pasoh Forest Reserve, and the second ever in Peninsular Malaysia. This extremely rare detection also provides valuable ecological information, expanding our current understanding of the species' potential habitat requirements and tolerance of environmental change.

The conservation status of this species is currently difficult to gauge due to the lack of detections, species-specific studies, or knowledge of past and current distributions. Pasoh Forest Reserve, surrounded by oil palm and rubber plantations, has become subjected to high poaching pressure; additionally, the disturbance from selective logging, expected to continue into the future, imposes a real threat for the conservation of many species in Pasoh, not just the flat-headed cat. Preventing poaching and overexploitation of natural resources is the biggest challenge for wildlife conservation in Pasoh.

Although flat-headed cats are not known to be a specific target for poachers in the region, side-catch poaching in small snares might pose an additional threat for the species in fragmented landscapes like Pasoh. Indeed, in these landscapes motor vehicle collisions and direct competition with domestic cats could pose more serious threats.

Another point worth mentioning is the similarity in phenotype between the flat-headed cat and some domestic cats – with no clear pelt markings on the flatheaded cat (Fig 1). Misidentification of this cat by the untrained eye is understandable. With greater species awareness, more direct sightings are likely to be recorded. Finally, we agree with Wilting et al. [1] that the flat-headed cat could be used as a flagship species to protect tropical lowland and peat swamp forests.

## Acknowledgements

This work is part of the terrestrial mammal and bird diversity monitoring programme conducted in Pasoh Forest Reserve by the Tropical Ecological Assessment and Monitoring (TEAM) Network and the Forest Research Institute Malaysia (FRIM). TEAM is a collaboration between Conservation International, the Missouri Botanical Garden, the Smithsonian Institution, and the Wildlife Conservation Society, and is partially funded by these institutions, the Gordon and Betty Moore Foundation, and other donors. Research permits were generously granted by the Forestry Department of Negeri Sembilan. We thank TEAM's network and especially Patrick Jansen for overall support and supervision for the project; Reuben Clements and Laurie Hedges for help in the identification of the species; and the team involved in fieldwork activities. The University of Nottingham funded the Open Access Publication Fee.

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