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# NEW RECORDS OF THE FLAT-HEADED CAT *PRIONAILURUS PLANICEPS* (VIGORS & HORSFIELD, 1827) (MAMMALIA: CARNIVORA: FELIDAE) IN WESTERN SARAWAK, MALAYSIA

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COMMUNICATION

# New records of the Flat-headed Cat *Prionailurus planiceps* (Vigors & Horsfield, 1827) (Mammalia: Carnivora: Felidae) in western Sarawak, Malaysia

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**Abstract:** The Endangered Flat-headed Cat is threatened due to loss of lowland and wetland habitats. Its elusive nature and low density occurrence make field sampling difficult. Compilation of records from both camera trapping and direct observation can provide important updates to its current distribution in Sarawak. In western Sarawak, the Flat-headed Cat was recorded in Maludam National Park, in Ulu Sebuyau National Park and at Sarawak River, which are the first confirmed records. The Flat-headed Cat appears to inhabit swamp forest in pristine protected areas as well as near human settlements. The conservation of peat swamp forests is crucial for its long-term persistence.

**Keywords:** Borneo, camera trap, conservation, national park, peat swamp forest.

**Abstrak:** Kucing Hutan hidup terancam berikutan hilangnya kawasan dataran rendah dan habitat tanah paya. Menyendiri dan sukar difahami serta kepadatan penghunian yang rendah mengakibatkan persampelan lapangan sukar. Pengumpulan rekod-rekod dari perangkap kamera dan pemerhatian secara langsung dapat memberikan maklumat yang penting mengenai penyebaran semasa di dalam Sarawak. Dalam Sarawak barat, Kucing Hutan telah direkodkan di dalam Taman Negara Maludam, di dalam Taman Negara Ulu Sebuyau dan di Sungai Sarawak, yang merupakan rekod buat pertama kalinya. Kucing Hutan dilihat mendiami hutan paya di dalam kawasan terlindung sepenuhnya serta berdekatan dengan penempatan manusia. Pemuliharaan hutan paya gambut amat penting bagi kesejahteraan dan kesinambungannya untuk jangka masa yang panjang.

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**Competing interests:** The authors declare no competing interests.

**Author details:** Mohd-Azlan Jayasilan has been conducting research and advocacy activities in the field of biodiversity conservation in Sarawak for over a decade. Current work complements the study on the distribution and ecology of carnivores in Sarawak. Thaqifah Syaza Jailan undertook master's degree specifically in researching carnivores within totally protected areas in Sarawak, Malaysia.

**Author contribution:** MAJ and TSJ conceived and designed the study. MAJ and TSJ collected the data, analysed and wrote the manuscript. Both authors read and approved the final manuscript.

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## INTRODUCTION

The Flat-headed Cat *Prionailurus planiceps* is one of the smallest felids in the world and the least studied of the five cat species in Borneo (Wadey et al. 2014; Wilting et al. 2016). In Malaysia, it was recorded in the lowlands of peninsular Malaysia, and of Sabah and Sarawak on Borneo (Wadey et al. 2014, 2017). It can be considered as a habitat specialist as it has been recorded mostly in lowlands associated with aquatic habitat such as peat swamp forest and riverine forest (Wilting et al. 2015; Phillipps & Phillipps 2016). Sarawak accounts for over 64% of the total peat swamp area in Malaysia, but is faced with the highest level of threat (Hon & Mohd-Azlan 2016). Major threats to the Flat-headed Cat include degradation and destruction of wetlands and lowland forests (Wilting et al. 2015). Hunting Flat-headed Cats for the pet or fur trade has not been recorded in Sarawak.

Limited distribution along with persistent loss of habitat have pushed this species into the IUCN Endangered category and Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (Wilting et al. 2015). The paucity of scientific information on its natural history and occurrence in the wild encouraged predictive modelling and predictive studies in Borneo (Wilting et al. 2010, 2016). Nevertheless, a record in a mangrove forest at close proximity to a settlement in Sarawak suggests this species may be able to co-exist with humans in sustainably managed areas (Tisen & Azad 2013).

Previous observations of this species in Sarawak were in two protected areas, namely Loagan Bunut National Park and Maludam National Park (Gumal et al. 2010). A captive individual at Kampung Buntal in North Kuching District was infected with feline pan-leukopenia virus (Tisen & Azad 2013).

Here, we report new observations of the Flat-headed Cat during opportunistic surveys along the Sarawak River near Kota Samarahan, in Maludam National Park and from a camera trapping survey in Ulu Sebuyau National Park.

## STUDY AREAS

Ulu Sebuyau National Park (USNP) was gazetted in 2010 with a total size of 182.87km$^2$ consisting primarily of peat swamp forest. Adjacent small patches of degraded isolated mangroves and Nipa Palm *Nypa fruticans* forests are heavily utilized by local people for aquaculture, fishing and crabbing. They practise traditional fishing methods, including the use of baited crab pods targeting Mud Crab *Scylla serrata*. Adjacent to the Batang Lupar River, USNP's many streams host a large population of Saltwater Crocodile *Crocodylus porosus*. USNP is currently not open to the public as it has no infrastructure and is far from human settlements.

The Maludam peat swamp forest encompasses one of the largest peat domes in northern Borneo. Due to the occurrence of species of conservation importance such as Proboscis Monkey *Nasalis larvatus*, Sarawak Surili *Presbytis chrysomelas* and hornbills *Anthracoceros albirostris*, *A. malayanus* and *Buceros rhinoceros*, this area was declared a national park by the Sarawak State Government in 2000. The 431.47km$^2$ park is divided by a 28-km stretch of the Maludam River that cuts across the park in the southeast-northwest direction. The waters of the Maludam River in the slow-moving, upstream stretches are clear and black in appearance due to tannin, whereas the flow downstream is influenced by tide. The dominant plant species along the riverbanks comprise *Pandanus andersonni*, several *Syzygium* species, *Hanguana malayana*, and the fan palm *Licuala petiolulata* (Nyanti et al. 2016). Sarawak River comprises a vast network of river branches with complex connections that are often more than 100km apart. The delta is at the South China Sea and experiences saltwater intrusion. The Sarawak River's upstream tributary comprises peat swamp and small patches of riverine forest. Most areas along the river are cultivated, and villages lie scattered along its banks.

## MATERIAL AND METHODS

Camera trapping in USNP was carried out between October 2015 and March 2017 using 19 passive infrared camera trap units (Bushnell® Trophy Cam). They were deployed at 19 locations near animal trails at least 500m apart along major rivers and hill ridges both within USNP and in the vicinity of park boundaries (Figure 1). They were mounted 20–30 cm above ground in order to increase the probability of detecting small- to medium-sized mammals. Seven camera traps were mounted very close to streams and in areas with high possibility of flood, indicated by watermarks on tree trunks, 50–115cm above ground to prevent them from flooding and subsequent malfunction. During the sampling period, camera traps were repositioned twice. The time delay between photographs was set to one minute. All cameras were operational 24 hours a day continuously throughout the survey period, except in instances of

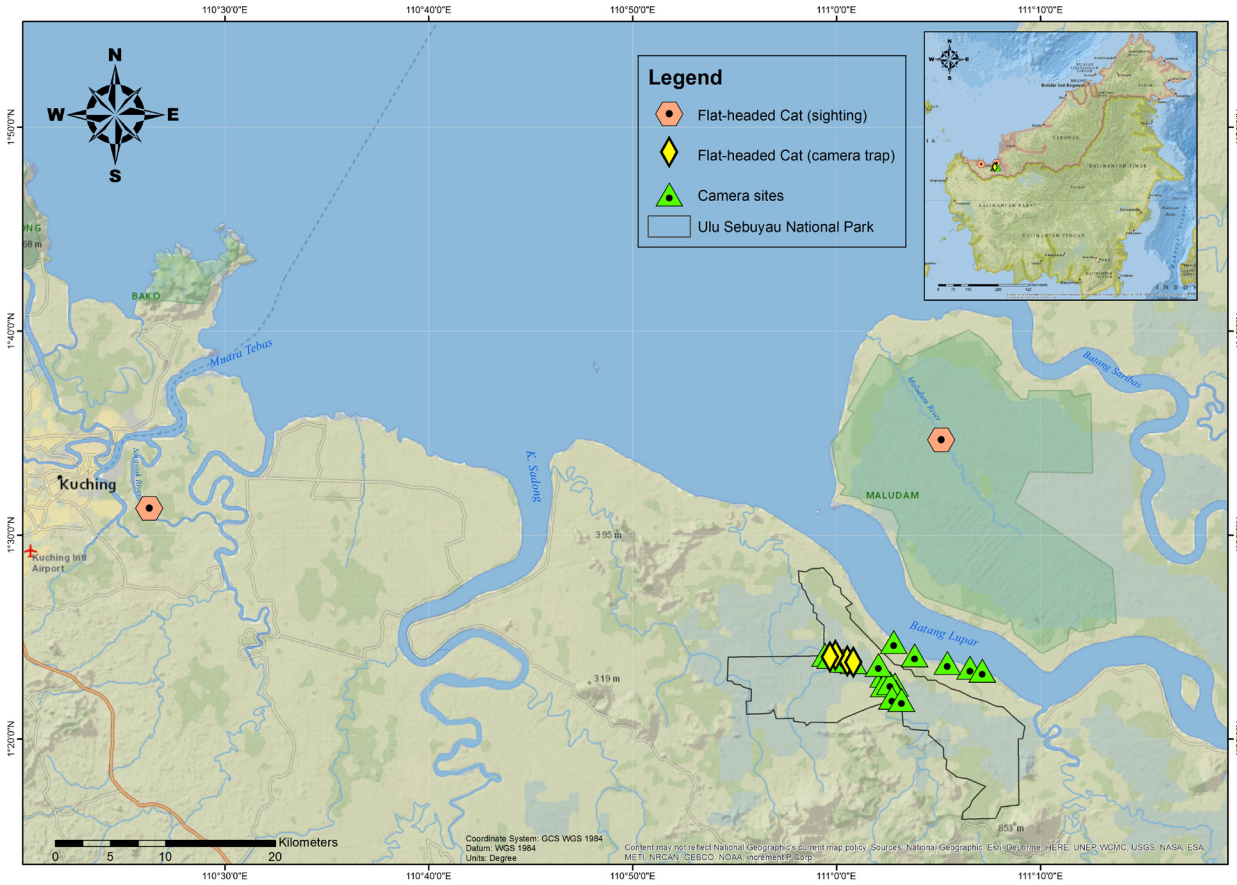


**Figure 1. Camera trapping sites in Ulu Sebuyau National Park with locations where Flat-headed Cats were detected.**

malfunction. Time and date were recorded for each exposure except during camera malfunction or excessive moisture due to high humidity and condensation. Only active camera trap days were used to calculate the number of camera trap days:

Total camera trap days (TCD) = $\Sigma$ cd $_i$

where c is the active camera operating within a site, and d is the number of days.

The overgrowth of water plants and abandoned logs in the river makes boat travel through several parts of the river difficult (Image 1). Consequently, the planned deployment of camera traps in several areas was not possible.

We used a Garmin GPSMAP 64S unit to determine coordinates (datum WGS84) and elevation of camera trap locations, which ranged from -1m to 13m elevation. The images were sorted by species, camera trap location and independent image. A notionally independent image was defined as the consecutive photographs of different species or the consecutive photographs of individuals of the same species taken an hour apart.

Boat surveys in the Maludam National Park (MNP) river were carried out in October 2013, and on the Sarawak River in February 2018. During these surveys, photographs were taken with a digital single-lens reflex camera (Canon EOS Rebel T1i).

## RESULTS

Camera trapping in USNP resulted in a total of 2,808 days of survey effort with 1,883 independent images obtained in 38 locations. The Flat-headed Cat was recorded at four locations in USNP with a total of seven independent images recorded at -1–13 m above sea level, representing approximately 0.37% of all independent images. All camera traps that photographed a Flat-headed Cat were situated less than 80m from USNP's main river (Image 2). The first Flat-headed Cat was recorded on day 16 and the last on day 198 of the total survey effort. After the camera traps were relocated further inside the forest, the Flat-headed Cat was not photographed again.

During night-time boat surveys, we covered 78km in

Image 1. The overgrowth of water plants and abandoned logs in the main river of Ulu Sebuyau National Park obstruct water transportation. © Thaqifah Syaza Jailan & Mohd-Azlan Jayasilan.


Image 2. Flat-headed Cat photographed at (a) Sarawak River, (b) Maludam National Park. © Anthony Pine.

48 hours in MNP and 15km in 16 hours on the Sarawak River. In MNP, a Flat-headed Cat was observed on 3 October 2013 at 06.25h, and at the Sarawak River near Loba Batu Blat on 15 February 2018 at 23.08h (Image 3). At both sites, the cats crouched quietly on the riverbanks, not bothered by the passing boat, thus providing opportunity to photograph them.

Details of records in surveyed sites are provided in Table 1.

## DISCUSSION

This study provides the first conclusive evidence that the Flat-headed Cat is present in USNP and MNP, confirming earlier predictive modelling results by Wilting et al. (2010). In addition, the observation of a Flat-headed Cat in the protected peat swamp landscapes asserts the importance of these habitats for the long-term survival of the species. The discovery of the Flat-headed Cat in USNP is a new addition to the species list in this park.

Our records indicate that the Flat-headed Cat is active both by night and day. This corroborates records obtained after sunset in Sumatra, Borneo, and peninsular Malaysia (Bezuijen 2000, 2003; Meijaard et al. 2005; Yasuda et al. 2007; Cheyne et al. 2009; Gumal

**Table 1. Records of Flat-headed Cat in Ulu Sebuyau National Park (USNP), Maludam National Park (MNP), and Sarawak River (SR) in Sarawak, Malaysia from 2013 to 2018.**

| Date and time of records | Coordinates and elevation | Location | Remarks |
|---|---|---|---|
| 03.x.2013, 06.25h | 1.580°N, 111.084°E; 1m | MNP | Resting on the riverbank |
| 01.xi.2015, 22.07h | 1.400°N, 110.994°E; -1m | USNP; *75m | Passing through |
| 30.xi.2015, 19.08h | 1.397°N, 111.009°E; 13m | USNP; *37m | Passing through |
| 11.xii.2015, 06.25h | 1.402°N, 110.999°E; 3m | USNP; *23m | Passing through |
| 17.iii.2016, 00.36h | 1.397°N, 111.009°E; 13m | USNP; *37m | Passing through |
| 23.iv.2016, 02.35h | 1.396° N, 111.013° E; 9m | USNP; *40m | Passing through |
| 23.iv.2016, 15.17h | 1.397°N, 111.009°E; 13m | USNP; *37m | Passing through |
| 15.ii.2018, 23.08h | 1.521°N, 110.438°E; -4m | SR | Resting on the riverbank |

*Approximate distance of camera traps from Ulu Sebuyau River.


**Image 3. Camera trap records of Flat-headed Cat in Ulu Sebuyau National Park. © Thaqifah Syaza Jailan & Mohd-Azlan Jayasilan.**

et al. 2010; Hearn et al. 2010), and by day in Borneo and peninsular Malaysia (Traeholt & Idris 2011; Gardner et al. 2014; Wadey et al. 2014; Baker & Chua 2016). Cheyne et al. (2009) recorded a Flat-headed Cat at approximately 2.5km from the Sabangau River after 622 camera trap nights in the Sabangau peat swamp forest. In our study it took less than 200 days to obtain photographs of the Flat-headed Cat at locations closer to the river. Flat-headed Cats were also observed near waterbodies such as riverbanks, small streams, ponds and lakesides by Yasuda et al. (2007), Mohamed et al. (2009), and Hearn et al. (2010). The observation of the Flat-headed Cat crouching near the river edge suggests that this species maybe adept at hunting aquatic prey species during the low tide when they are easily accessible.

The Fishing Cat *Prionailurus viverrinus* is the only other cat in Asia that has also been observed sitting on the banks of watercourses, apparently lying in wait for aquatic prey (Mukherjee 1989; Malla & Sivakumar 2014; Taylor et al. 2016; Naing Lin & Platt 2019). Detectability may be increased, if camera traps in future surveys are placed closer to such potential hunting grounds of the Flat-headed Cat instead of placing them on forest roads or trails.

The widespread degradation, fragmentation and loss of suitable habitat for the species raise concerns about the long-term persistence of the Flat-headed Cat in Sarawak. The remaining Flat-headed Cat population in Sarawak is probably small, fragmented and most likely inhabiting areas near increasingly polluted, turgid watercourses (Mohd-Azlan & Das 2016). While its presence in the Sarawak River area is promising news, this area is heavily affected by anthropogenic activities like plantation and infrastructure development. There is a high risk of localised extinction in the short term as a consequence of such anthropogenic pressures and rapid landscape changes. Nonetheless, there is no evidence of widespread hunting of the Flat-headed Cat in Sarawak. If the remaining peat swamp forest of Sarawak are, however, managed sustainably, the long-term viability of Flat-headed Cat populations can possibly be sustained.

The usage of camera trapping in documenting Flat-headed Cat is challenging in peat swamp forests and mangroves. Often, cameras need to be set at sharp angles higher up in trees to avoid inundation in tidal areas or during the monsoon season. This setting may have affected the detection probability because only larger mammals can be detected from such a camera position. Direct observation using a boat survey can be considered as an alternative method in studying the Flat-

headed Cat especially in peat swamp forests. Sightings during boat surveys will, however, only be possible near riverbanks. The new records of Flat-headed Cat reported here further supports the conclusion of earlier authors that the conservation of peat swamp forests is crucial for the survival of this cryptic species. More camera trapping surveys and boat surveys in peat swamp forest patches can shed important light on the importance of preserving small fragmented forest patches in a rapidly changing landscape.

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