

# Camera-trap evidence of Large-spotted Civet *Viverra megaspila* in Khao Ang Rue Nai Wildlife Sanctuary and Khao Yai National Park, Thailand

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## Abstract

Large-spotted Civet *Viverra megaspila* records warrant documentation with publicly verifiable evidence because the species is currently IUCN Red-Listed as Vulnerable. We present camera-trapping and habitat records of the species from two protected areas lacking previous verifiable records. Locations support past suggestions that it is a lowland forest species; given the heavy clearance of plains forest in Thailand, it is likely to be genuinely very localised in the country now.

**Keywords:** evergreen forest, Large Indian Civet, Lowland forests, *Viverra zibetha*

การถ่ายภาพกล้องดักถ่ายชะมดสันหางดำในเขตรักษาพันธุ์สัตว์ป่าเขาอ่างฤๅไนและอุทยานแห่งชาติเขาใหญ่ ประเทศไทย

## บทคัดย่อ

ชะมดสันหางดำได้ถูกบันทึกลงเอกสารที่มีการรับรองและเปิดเผยได้ต่อสาธารณชนเพราะเป็นสัตว์ที่พบทั่วโลกสูญพันธุ์ตาม ที่ IUCN ได้ประกาศไว้ การศึกษาวิจัยในครั้งนี้ได้แสดงถิ่นที่อยู่อาศัยและการติดตั้งกล้องดักถ่ายภาพสัตว์ในบริเวณป่าอนุรักษ์สองแห่งที่ไม่มีข้อมูลการปรากฏแน่ชัดของสัตว์ชนิดนี้ และพบว่าพื้นที่ป่าบริเวณที่รวบรวมเป็นแหล่งที่อยู่อาศัยที่เหมาะสมของสัตว์ชนิดนี้ แต่ป่าบริเวณที่รวบรวมยังมีอยู่อย่างจำกัดในประเทศไทยในปัจจุบัน

**คำสำคัญ:** การยกระดับให้สูงขึ้น, ป่าไม่ผลัดใบ, ชะมดหางป่อง, การสร้างป่าอนุรักษ์, *Viverra zibetha*

## Introduction

There are few published data on the status and patterns of geographic variation of the Large-spotted Civet *Viverra megaspila*. Across its range in Cambodia, Laos, Myanmar, Thailand, Vietnam, West Malaysia, and southern China, *V. megaspila* occurs mainly in fragmented populations in lowland evergreen forests (Francis 2008). Lynam *et al.* (2005), reviewing some recent records, found that most were from below 300 m elevation. Large-spotted Civet is listed as Vulnerable on the IUCN Red List (IUCN 2009), and the Action Plan of the [then] IUCN/SSC Mustelid and Viverrid Specialist Group (Schreiber *et al.* 1989) recommended field studies focusing on causes of the “natural scarcity” of the species, specifically noting a lack of records from the generally well-studied Khao Yai National Park (KYNP), Thailand.

In Thailand, despite several carnivore studies (e.g. Srikosamata 1993, Austin 2002, Lynam *et al.* 2003, Grassman *et al.* 2005a, 2005b), there are published recent records only of an unverified sighting by staff in Huay Kha Khaeng Wildlife Sanctuary in the Western Forest Complex (Rabinowitz & Walker 1991) and photographs from two locations in Tapraya National Park on the eastern edge of the Dong Phrayayen–Khao Yai Forest Complex (Lynam *et al.* 2005). A record from KYNP of a Large-spotted Civet camera-trapped during 2000–2002 gave no evidence of how the photograph was identified (Suzuki *et al.* 2006). The species’s localised distribution and current threat categorisation urge documentation of occurrences with public evidence. Here, we present camera-trapping records of the species and habitat data from two protected areas in Thailand.

## Methods

We conducted camera-trapping surveys in KYNP and Khao Ang Rue Nai Wildlife Sanctuary (KARN) using passive infra-red sensors for heat and motion (CamTrakker® CamTrak South, Inc., Wat-

kinsville, GA 30677 USA). Cameras are effective in covering a wide area to document, verifiably, species presence (e.g. Griffiths & van Schaik 1993, Carbone *et al.* 2001, Moruzzi *et al.* 2002). Cameras were set approximately 50 cm above ground, 10–20 m from the intended monitoring area, camouflaged with foliage, and, in some locations in KARN baited with commercial scent lures (Minnesota Trapline Products, Pennock, MN 56279 USA) or Sambar *Rusa unicolor* road kill. Photographs of *V. megaspila* clearly show lines of relatively large, bold, and boldly edged spots on the flank and a black dorsal stripe to the tail (Fig. 1) which are the most easily seen body features to differentiate between *V. megaspila* and Large Indian Civet *V. zibetha* (Duckworth 1994).

## Study Site and Records

Field surveys in KYNP (2,168 km<sup>2</sup>, 14°05–15′N; 101°05–50′E) in south-central Thailand covered each of the 22 management zones



Fig. 1. Large-spotted Civet *Viverra megaspila* in dry evergreen forest in northeastern Khao Yai National Park, Thailand.

Table 1. Camera-trap records of Large-spotted Civet in Khao Yai National Park, Thailand.

| Location of camera-trap   | Date                        | Time           | Elevation (m) | Habitat                                       |
|---|-----------------------------|----------------|---------------|---|
| 14°20'N, 101°43'E<br>Zone KY04 (Klongpa Gung); north of Khao Kamphaeng along the Lam Phra Phloeng River     | 22 Oct 2006*                | 18h31          | 470           | Dry evergreen forest                          |
| 14°21'N, 101°43'E<br>Approx. 250 m outside the park boundary of Zone KY04; along the Lam Phra Phloeng River | 22 Oct 2006*<br>20 Oct 2006 | 18h32<br>02h18 | 460           | Patchy dry evergreen forest/agricultural area |
|   | 29 Oct 2006                 | 18h41          |               |   |

\*same individual, as identified by coat pattern

Elevation was estimated from a Thailand 1:50,000 topographic map, edition: 3\_RTSD, series L7017, sheet and year unknown.

of the park (Lynam *et al.* 2003) at least once. Cameras were set at elevations of 40–1,340 m in a wide range of habitats: tropical rainforest, dry evergreen forest, hill evergreen forest, mixed deciduous forest, dry dipterocarp forest, and grassland. Camera-trapping ran from October 2003 until March 2007 during all seasons of the year. From 6,253 total trap nights in the park, four photos of Large-spotted Civet were recorded at two locations near the park boundary of zone KY04 (Table 1; Fig. 1). Both locations were within 350 m of the nearest stream and the park boundary, and separated by 890 m.

KARN (1,079 km<sup>2</sup>; 13°00'–13°32'N, 101°40'–102°09'E), in eastern Thailand, encompasses the country's last remaining

lowland rainforest. Elevations from 0 m to 170 m were camera-trapped in KARN from January 2008 to September 2009. From 3,650 trap nights, 23 photos (at eight locations) of Large-spotted Civets (Table 2) were recorded. All sites excluding one detecting Large-spotted Civet were within 2 km of Ban Phu Thai, the location of the Chachoengsao Wildlife Research Station in secondary forest. All sites are on waterways and two were near Samsao Canal, a permanent water source. Six out of 14 camera sessions that yielded Large-spotted Civet photos included a scent lure/bait: All Call, Pro's Choice, or Old Yeller lures were used, but not repeatedly enough to confirm whether or not they are specifically effective for attracting Large-spotted Civets.

Table 2. Camera-trap records of Large-spotted Civets in Khao Ang Rue Nai Wildlife Sanctuary, Thailand.

| Location of camera-trap | Elevation (m) | Date       | Time  | Habitat |
|-------------------------|---------------|------------|-------|---------|
| 13°29'N, 101°52'E       | 105           | 31 Apr 08  | 21h24 | A       |
| 13°25'N, 101°53'E       | 120           | 14 May 08  | 18h51 | DEF     |
|                         |               | 13 Aug 08  | 22h02 |         |
| 13°25'N, 101°52'E       | 100           | 9 Oct 08   | 02h47 | TP      |
| 13°24'N, 101°53'E       | 105           | 5 Dec 08   | 01h45 | DEF     |
|                         |               | 9 Dec 08*  | 23h03 |         |
|                         |               | 10 Dec 08  | 00h43 |         |
| 13°23'N, 101°52'E       | 100           | 11 Dec 08  | 05h15 | TP      |
|                         |               | 11 Dec 08  | 20h35 |         |
|                         |               | 19 Dec 08* | 00h23 |         |
| 13°24'N, 101°52'E       | 100           | 30 Dec 08  | 21h13 | TP      |
| 13°25'N, 101°53'E       | 115           | 23 Jun 09  | 19h51 | DEF     |
|                         |               | 4 Aug 09   | 21h07 |         |
|                         |               | 14 Aug 09  | 06h15 |         |
|                         |               | 27 Aug 09* | 05h46 |         |
|                         |               | 4 Sep 09   | 06h09 |         |
|                         |               | 13 Sep 09  | 04h36 |         |
|                         |               | 14 Sep 09  | 02h06 |         |
|                         |               | 24 Sep 09  | 03h52 |         |
|                         |               | 2 Oct 09*  | 04h51 |         |
|                         |               | 8 Oct 09   | 19h57 |         |
|                         |               | 16 Oct 09  | 19h53 |         |
| 13°24'N, 101°54'E       | 120           | 1 Oct 09   | 20h10 | DEF     |

\*same individual, as identified by coat pattern. The total number of animals involved in the other photographs is not known.

Habitats: A, Agricultural area; DEF, Dry evergreen forest; TP, Teak plantation

Elevation was estimated from a Thailand 1:50,000 topographic map, edition: 3\_RTSD, series L7017, sheet: 53351, year: 1991.

## Discussion

These records verify the presence of Large-spotted Civet in KYNP where there has been no recent confirmation of its presence (Lynam *et al.* 2003, but see Suzuki *et al.* 2006). We speculate that we detected Large-spotted Civet when previous camera-trapping (Lynam *et al.* 2006) did not because our intensive sampling went beyond the park's core area to include all zones and edges; some camera locations were a few hundred meters lower than the general study area of Khao Yai where most surveyors spend their time.

Even so, the records from KYNP are from slightly higher than the 300 m general cutoff suggested by Lynam *et al.* (2005), albeit based on rather few records and locally exceeded (e.g. Holden & Neang Thy 2009). There is no other low-elevation habitat in the surroundings: south is a high-elevation ridge and in the north lies human habitation and agricultural lands, still above 400 m. The area is scrubby dry evergreen forest close to the border of the National Park in an area of high human use. One camera-trap also photographed hunters carrying small-animal traps, recalling Large-spotted Civet records from Tapraya National Park (Lynam *et al.* 2005), corroborating that the species is not particularly sensitive to edge/degraded areas (Duckworth 1994, Austin 1999).

It was not possible to determine if photographs at KYNP were of the same individual because only the left flank was recorded at one site and only the right flank at the other. Large Indian Civets reportedly average 1.7 km in daily movements (Rabinowitz 1991), so both camera locations could be within the home range of one individual Large-spotted Civet. The record of one Large-spotted Civet contrasts with the many (n=42) Large Indian Civets photographed throughout KYNP.

In dry evergreen lowlands of KARN, Large-spotted Civet was more commonly found than Large Indian Civet (n=7) with no camera-trap location recording both. Our data agree with previous assessments of Large-spotted Civet as a lowland species able

to cope with degraded habitat (Austin 1999, Lynam *et al.* 2005, Francis 2008). The lower detection of Large Indian Civet in predominantly lowland KARN, where populations of Large-spotted Civet seem higher, (see also Austin 1999) contrasts with other, higher-altitude protected areas, such as KYNP, where the reverse is true. We would expect this if Large-spotted Civet is dominant at lower elevations. Further research with exclusion experiments would help determine the level of direct competition, and what causes Large-spotted Civet to be more successful in the lowland forests. Given that most of the lowland forest in Thailand has been converted to agricultural areas (Hirsch 1990), the outlook for the country's Large-spotted Civets is grim.

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