Canid Biology & Conservation

 ISSN 1478-2677

Distribution update

First records of golden jackal in Phou Hin Poun National Park, Khammouane province, People's Democratic Republic of Lao

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Keywords: *Canis aureus*, Indochina, karst, Laos

Abstract

We report the photo capture of golden jackals *Canis aureus* from Phou Hin Poun National Park, better known as the Khammouane Limestone Key Biodiversity Area, in Khammouane province, the People's Democratic Republic of Lao. Golden jackals were recorded at four different camera trap stations across the protected area in three different districts, providing the first conclusive evidence of golden jackal presence there. This would represent a distributional extension for the species, or recolonisation following the local extinction of large cats and dholes from the area.

Introduction

The Phou Hin Poun National Park (17°26'-18°10'N / 104°24'-105°11'E) covers approximately 2,000km^2, mostly of sparsely vegetated karst at 180–900m a.s.l., with pockets of tall forest in depressions in the rock and valleys (Figure 1). It is part of an extensive limestone formation stretching from central Annam (Vietnam) to north of the Hinboun river in the Central region of the People's Democratic Republic of Lao (Lao PDR). Although most of the area is sparsely vegetated karst and mixed deciduous forest patches, there is a large area of gentler limestone terrain, which is predominantly covered in quite mature secondary semi-evergreen forest, with some areas of shorter younger secondary growth (Timmins 1997). Water sources in this area are very limited. There are no permanent streams within the survey area. The only available water sources throughout the dry season (November – May) consists of water in caves and water holes in the rocks. To date only few biodiversity surveys have been conducted in Phou Hin Poun (Timmins 1997, Steinmetz 1998, Phiapalath et al. 2012, Brakels & Somdachit 2020).

Three opportunistic camera trap surveys have been carried out to date, March – December 2018, November 2022 – May 2023, and November 2023 – June 2024. The main objective of these surveys was to confirm the presence of small- to medium-sized mammals of conservation concern, which was part of a rapid biodiversity assessment to determine the biodiversity values of different parts of the protected area. The total survey area was 146km^2 in size and encompassed five different administrative districts. All camera traps were setup at a height of 50cm from the ground, the majority near waterholes or wildlife trails to opportunistically record wildlife. One camera trap (in Thakhek district) was set to take photos and videos, while the others were set to take at least three photos in a row. In 2018 only 12 camera traps were deployed (PC900 Hyperfire Professional IR, Reconyx, Holmen, WI, USA) across 23 trapping stations, totalling 1,316 trapping days. For the second survey 55 camera traps (Big Eye D3N, Bushwhacker, Shenzhen, China) were deployed in 55 trapping stations, totalling 6,972 trapping days. The final survey deployed 64 Big Eye D3N cameras), totalling 8,686 trapping days.

Results & Discussion

We observed in total 10 independent golden jackal *Canis aureus* records from four distinct sites. Of these observations, five were at night, one at dawn, and four during the daytime (Table 1). All captures were of a single individual, although it was unclear if the photo captures were those of a single individual or multiple animals.

One individual golden jackal was recorded on 22 March 2018 in Khounkham district, approx. 6km south of Konglor village area, in karst forest along the limestone cliff. Other wildlife recorded in this area included Asiatic black bear *Ursus thibetanus*, clouded leopard *Neofelis nebulosa*, marbled cat *Pardofelis marmorata*, large Indian civet *Viverra zibetha*, binturong *Arctictis binturong*, yellow-throated marten *Martes flavigula*, ferret badger *Melogale* spp., northern red muntjak *Muntiacus vaginalis*, mainland serow *Capricornis sumatraensis*, Assamese macaque *Macaca assamensis* and Asiatic brush-tailed porcupine *Atherurus macrourus*.

An individual golden jackal was also recorded in Thakhek district on 03 March 2023, approx. 3km south of Phondou village and just 300m away from the nearest agricultural land. It was recorded near a natural karst waterhole frequently visited by domestic water buffalo in open forest shrubland, which has been mostly cleared, with several farmlands in the vicinity. Other wildlife recorded here included wild pig *Sus scrofa*, large Indian civet,

The following is the established format for referencing this article:

Brakels, P and Souwideth, J. 2026. First records of golden jackal in Phou Hin Poun National Park, Khammouane province, People's Democratic Republic of Lao. *Canid Biology & Conservation* 29(1): 1-4. URL: http://www.canids.org/CBC/29/Golden_jackals_Lao_PDR .pdf

common palm civet *Paradoxurus hermaphroditus*, mainland leopard cat *Prionailurus bengalensis* and ferret badger.

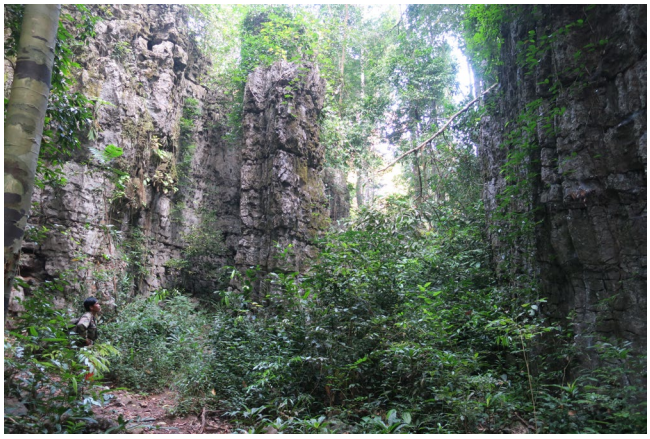

Figure 1. Karst forest habitat in Phou Hin Poun National Park.

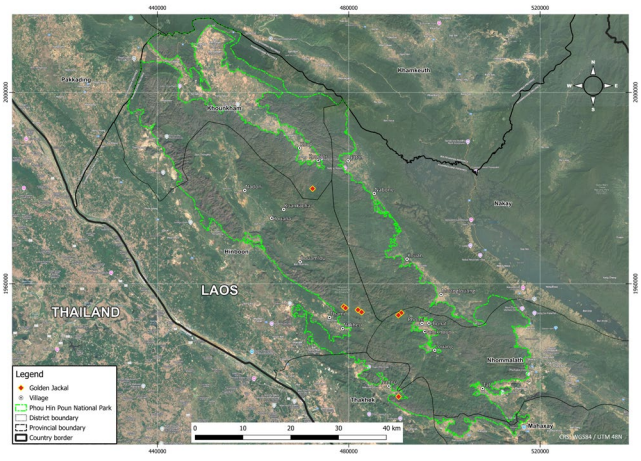

Figure 2. Map of Phou Hin Poun National Park and the camera trap locations where golden jackals were recorded.

The individual golden jackal from Nhommalath district, recorded on 04 and 06 March 2023, approx. 6km north of Phonsi village, was likely the same individual since both camera trap stations were in the same valley, less than 800m away. They were in a seasonal stream in karst forest, with some deeper pools of water that contain water all year round. Other wildlife recorded at this camera trap station included large Indian civet, large-spotted civet *Viverra megaspila*, common palm civet, mainland leopard cat, stump-tail macaque *Macaca arctoides*, Malayan porcupine *Hystrix brachyura*, and Asiatic brush-tailed porcupine.

During the last survey, a golden jackal was recorded in Hinboun district, near Thami and Nakue village. The area consists of a large flat-bottomed valley surrounded by limestone cliffs, the forest type in the valley consists of mixed deciduous and dry dipterocarp forest. The jackal was photographed on four separate occasions, firstly on 27 December 2023 at two different camera trap stations at 900m a.s.l. (Figure 3a,b). Additional observations were made on 03, 18, and 19 January 2024. Other wildlife recorded on these camera traps include large spotted civet, common palm civet, greater hog badger *Arctonyx collaris*, Javan mongoose *Urva javanica*, ferret badger, yellow-throated marten, mainland leopard cat, Asiatic black bear, Asiatic brush-tailed porcupine, mainland serow, northern red muntjac, Assamese macaque, northern pig-tailed macaque *Macaca leonina,* and Laotian langur *Trachypithecus laotum*.

The distance between the individual from Khounkham and the nearest individual from Yommalath district was 45–50km as per accessible route through these limestone mountains. The distance between the jackal location from Hinboun district and Nhommalath district is 10km and could therefore have been the same individual. However, both areas are surrounded by high limestone cliffs and geographically isolated. Lastly, the individual in Thakhek district was 30km away from the former site, involving

Figure 3 (a,b). Golden jackal captured in Phou Hin Poun National Park.

at least crossing one karst pass at 500m elevation. The latter would therefore be unlikely the same individual, since the individual in Nhommalath district was recorded the next morning around 10:00. Golden jackals can travel up to 12–15km during a single night in search of either food or more suitable habitat (Moehlman 1983; Kamler et al. 2021), which is well below the 30km between the individuals from Thakhek and Nhommalath. Home range size for the Indochinese jackal *C. a. cruesemanni* range between 26–47km² (Charaspet et al. 2019, Kamler et al. 2021), larger than recorded for other subspecies. Based on these studies from Thailand and Cambodia, it is likely that the home range of jackals from Phou Hin Poun fall within the same range.

Little is known about the distribution and status of jackals in Lao PDR and Vietnam, where the species appears to be scarce and localized (WCS 2024, Duckworth et al. 1999, Hoffmann et al. 2019). Duckworth et al. (1998) reviewed what was known of the range of the species at the time in Indochina, noting its presence in low-lying regions of eastern Cambodia, southern Vietnam, and southern Lao PDR. The most recent records of golden jackal in Cambodia have been reported from Srepok Wildlife Sanctuary in Mondulkiri province (Kamler et al. 2021) and Siem Pang Wildlife Sanctuary in Stung Treng Province (Loveridge et al. 2018). Although there are no recent sightings reported, this species is still thought to persist in Vietnam, Dak Lak province, the border area of Srepok Wildlife Sanctuary (Hoffmann et al. 2019). In Lao PDR more recently, a golden jackal was recorded on a camera trap in Nga district, Oudomxay province, around 6km north of the Mekong river (Initial. Phaipalath, pers. comm. 2025). Furthermore, golden jackals are still known to persist in the south of Lao PDR, in and around Xe Pian National Park (NP; Phiapalath 2018), which shares its border with Siem Pang Wildlife Sanctuary, Cambodia. In addition, they have been previously recorded in Khammouane province, on the Nakai Plateau, just east from Phou Hin Poun (Dersu 2008). However, they have likely disappeared from the area after the flooding of the Nam Theun II reservoir (Hoffmann et al. 2018). The easternmost confirmed sightings of golden jackals in Thailand are from Phanom Dong Rak Wildlife Sanctuary in Sisaket province (Thai National Parks 2023). Other confirmed sites relatively close to the Lao PDR border can be found in Phu Kradueng NP, Loei Province; Nam Hao NP, Phetchabun province and Phu Khiao NP in Chaiyaphum province (Thai National Parks 2023, Figure 4).

Table 1. Photo capture details of golden jackal from Phou Hin Poun NP, Lao PDR.

Date	Time	Latitude	Longitude	Elevation (m a.s.l)	District	Camera Trap Days
22-03-2018	00:17	17.90673	104.73973	361	Khounkham	103
03-03-2023	18:43	17.51417	104.90958	178	Thakhek	112
04-03-2023	10:24	17.67220	104.91486	375	Nhommalath	172
06-03-2023	23:40	17.66799	104.90917	252	Nhommalath	172
27-12-2023	05:00	17.67357	104.83665	184	Hinboon	172
27-12-2023	09:36	17.67796	104.82947	167	Hinboon	172
03-01-2024	10:56	17.68384	104.80157	172	Hinboon	175
03-01-2024	21:13	17.68384	104.80157	172	Hinboon	175
18-01-2024	09:42	17.68137	104.80522	167	Hinboon	175
19-01-2024	09:36	17.67796	104.82947	167	Hinboon	172

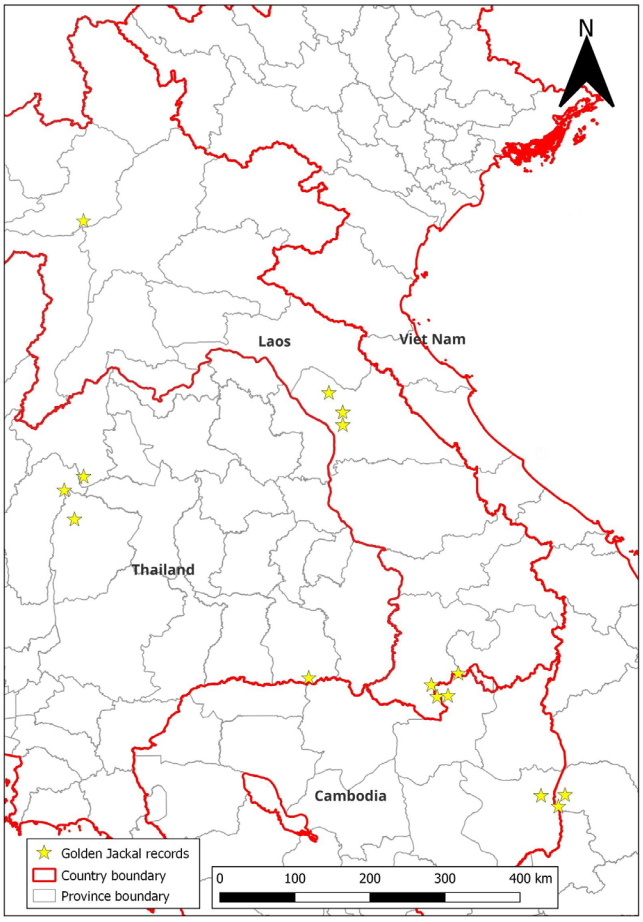

Figure 4. Distribution of golden jackal in its easternmost known range of Indochina.

The golden jackal population from Thailand was found to be an Indochinese jackal, a distinct subspecies (Sosale et al. 2023). This jackal was originally described by Matschie 1900 from living specimens in the Berlin Zoological Garden that came from southwest Siam (now Thailand). It is anticipated that the Indochinese jackal likely represents the easternmost population, including Laos, Cambodia and Vietnam, of the golden jackal (Moehlman and Hayssen 2018). This information will add to the knowledge of this seemingly rare subspecies of golden jackal in the eastern most part of its range.

Very little is known about the historic and current distribution and abundance of golden jackals in Lao PDR, often lacking detail oftheir ecology and habitat associations. Records in the 1990s came only from the Lao lowlands, where jackal sightings were associated with deciduous dipterocarp forest although it is presumed they would also use other open habitat types, including agricultural mosaics (Duckworth et al. 1999, Dersu 2008). We entertain two hypotheses to explain why golden jackal populations are currently much reduced compared to what existing habitat could support (although prey populations are probably also highly reduced). This has probably been a consequence of decades of hunting and possibly other forms of persecution. On the other hand, these numerous 'new' records in the karst landscape of Phou Hin Poun could indicate a recolonisation mediated by the disappearance of large cats (leopard *Pantera pardus* and tiger *P. tigris*) and dhole *Cuon alpinus* from this landscape. These natural competitors of golden jackals were still present in this landscape up until the late 1990s (Duckworth et al. 1999). Golden jackals may have been widely overlooked because anthropogenic open habitats, as well as pine forests and upland grasslands, have not been a survey focus, and the deciduous dipterocarp and xeric semi-evergreen forests of the Lao lowlands have received much less effort since 1999 than dense forests of the Annamites and Northern Lao (WCS 2024). Therefore, golden jackals could be more widespread and abundant in Lao PDR than currently assumed.

Acknowledgements

These surveys were conducted as part of the Southern White Cheeked Gibbon Planning and Protection Project with funding provided by the Arcus Foundation. Work in PHP NPA is with permission of the Provincial office of Agriculture and Forestry (PAFO) in Khammouane under an MoU with the Department of Forestry (DoF), Ministry of Agriculture and Forestry, Vientiane Capital, Lao PDR. Thanks to Anouxay Bounthammy of Lao Landscapes and Livelihoods Project and Montee Phouthaamard, Department of Forestry. We thank Mr Lienphet Phetphilanon from PAFO Khammouane for coordination and logistics. Special thanks go to the Lae Oudomsack in Ngommalath, Kongla Phachoomphon in Khounkham and Sylae Xayaphone in Thakhek for leading these camera trap surveys, and to the villagers from Konglor, Nakhue, Pondou and Phonsi, for their assistance.

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