

## REPORT

### FIRST BREEDING RECORD OF ASIAN SMALL-CLAWED OTTER *Aonyx cinereus* (ILLIGER, 1815) FROM SAHYADRI TIGER RESERVE, WESTERN GHATS, INDIA

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**ABSTRACT:** Sahyadri Tiger Reserve is a very understudied complex of the Western Ghats landscape of India. The presence of diverse and heterogenous habitats supports a diverse species assembly. Here, we report on the occurrence and breeding of Asian Smallclawed Otters in the tiger reserve through opportunistic camera trapping conducted from November 2021–March 2022 at sampled locations along streams. Asian Small-clawed Otters were recorded from five locations with a photographic capture rate of 0.94 ( $\pm$  0.57 SE) and in group sizes of 1–5 individuals, including pups. However, extensive surveys are necessary to generate reliable abundance estimates and to clearly understand otter distribution patterns in this landscape.

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**KEYWORDS:** Camera traps, Northern Western Ghats, Mustelidae, Carnivore, Sahyadri Tiger Reserve

### INTRODUCTION

India is the westernmost range of the Asian Small-clawed Otter worldwide (Wright et al., 2021). This species is distributed across northeast India, the Himalayan foothills, Eastern Ghats, and Western Ghats (Hussain, 1999; Sharma et al., 2014). The

Asian Small-clawed Otter occurs in freshwater and peat swamp forests, rice fields, lakes, streams, reservoirs, canals, mangroves, and along coasts (Hussain et al., 2011). In the Western Ghats, the species prefers high-altitude areas with stream pools (Perinchery et al., 2011), which was found to be contradictory by Punjabi et al. (2014) as they recorded the species' presence across an elevation gradient of 43–821 m. The species occupies narrow, fast-flowing, and rocky streams, with dense vegetation and tall grasses on both sides of the bank to provide adequate escape cover (Raha and Hussain 2016). The species is sympatric with the Smooth-coated and Eurasian otter. In India, all three species occur in the Western Ghats, Eastern coast and in northeast India (Menon, 2014; Debata et al., 2020; Wright et al., 2021).

Although there is a paucity of robust abundance estimates and population trends, it is suspected that the global population of the Asian Small-clawed Otter has declined by >30% over the past 30 years (Pacifici et al., 2013; Wright et al., 2021). It is further suspected that the future decline can be at least 30% over the next 30 years. The species is classified as Vulnerable by the IUCN Red List of Threatened Species (Wright et al., 2021) and is listed in Appendix II of CITES. It is listed in Schedule I of the Indian Wild Life (Protection) Act, 1972 (amended to date) (WPA, 2022).

The available information on the species ecology primarily comes from the southern Western Ghats. Although the river ecosystems of the northern Western Ghats have been poorly studied, certain remote stream habitats still harbor some of the rare and elusive species, such as otters. Earlier researchers remarked on the lack of species-specific surveys and an overall ecological understanding of otter species (Punjabi et al., 2014). Here, we report the first robust evidence of the occurrence and breeding of the Asian Small-clawed Otter in Sahyadri Tiger Reserve, the northern Western Ghats in Maharashtra state, India.

## **STUDY AREA**

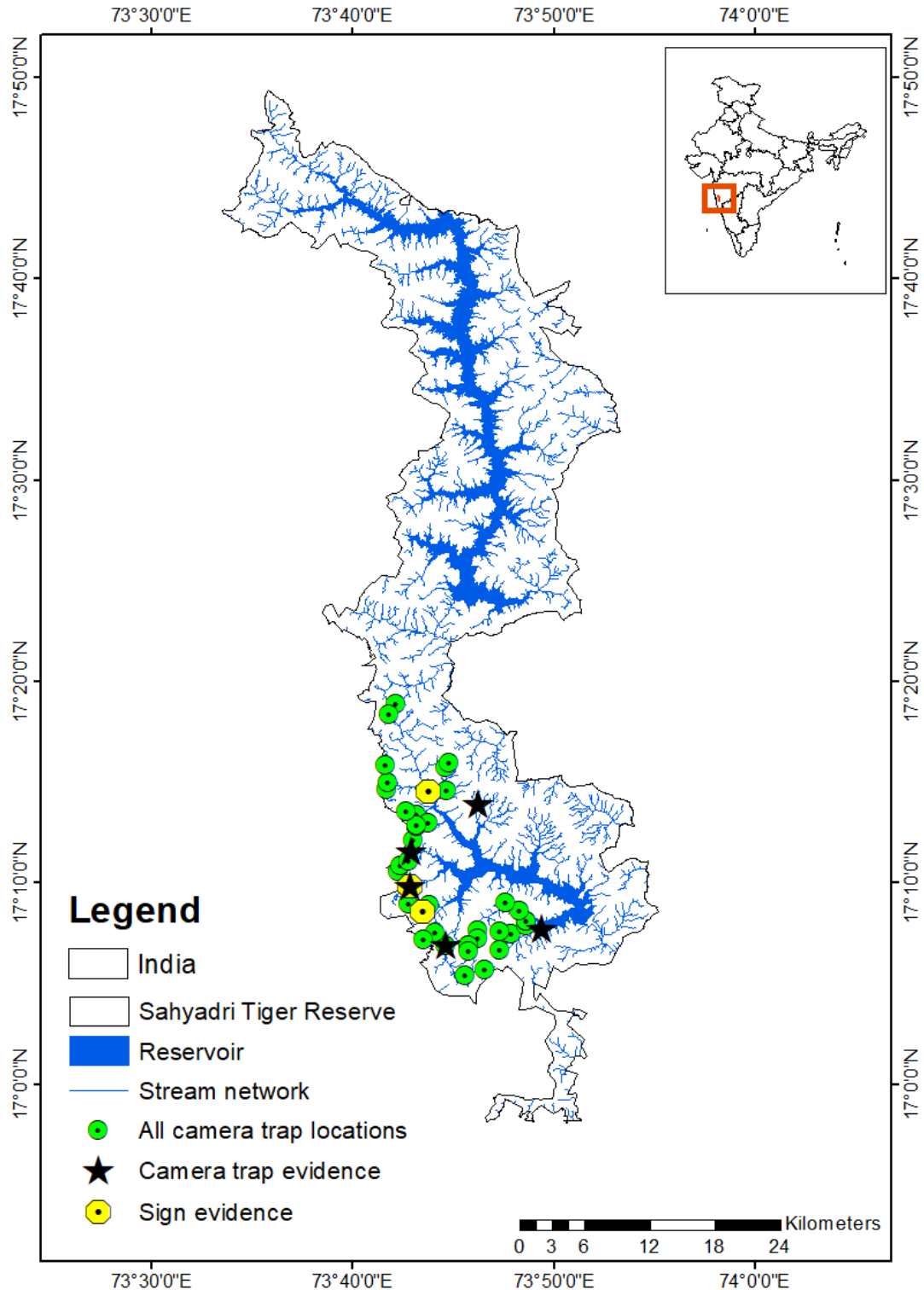
Sahyadri Tiger Reserve (STR), located in the northern Western Ghats of India, spans over an area of 1166 km<sup>2</sup>, jointly comprised of Chandoli National Park and Koyna Wildlife Sanctuary. The reserve has a rugged terrain with an altitudinal gradient of 350–1250 m. The tiger reserve consists of two major reservoirs: Shivsagar and Vasant Sagar. Undulating topography births numerous torrential streams from the headwater regions feeding into these reservoirs. A previous study reported high fish diversity in its stream and reservoirs. A total of fifty species of fish were recorded from the STR, of which significant species were insectivorous, omnivorous, and herbivorous in their diet preference (Johnson et al., 2019). The STR experiences a mean annual rainfall of 5000 mm from June to September (Joglekar et al., 2015). The tiger reserve represents a heterogeneous landscape covering dense forest, open forest, scrubland, barren land, agricultural land, water body, and reservoir bed (Jelil et al., 2020). The tiger reserve supports some of the few remaining undisturbed tall evergreen forests in the northern Western Ghats. It hosts large mammal species such as the common leopard *Panthera pardus fusca*, dhole *Cuon alpinus*, sloth bear *Melursus ursinus*, Indian gaur *Bos gaurus*, and sambar *Rusa unicolor* (Joglekar et al., 2015; Jelil et al., 2021).

## **MATERIALS AND METHODS**

Thirty-eight camera traps were deployed at trails along streams in Chandoli National Park, the southern part of Sahyadri Tiger Reserve, from November 2021–April 2022 (Fig. 1). We used single-sided Cuddeback (C1 model) cameras on suitable trees at 45–50 cm height. Cameras were active 24 hours daily and set on FAP (fast as

possible) mode when triggered. These cameras were monitored weekly to ensure proper functioning and data backup. The mean camera trap nights were 55.04 ( $\pm 1.09$  SE).

Additionally, opportunistic sign surveys were conducted at trails along streams (Fig. 1). The Asian Small-clawed Otter signs were identified and confirmed based on Prater (1971) and Hussain et al. (2011) descriptions.



**Figure 1.** Map of the study area with camera trap locations, camera trap capture locations, and sign evidence locations of the Asian Small-clawed Otter photo-captures from Sahyadri Tiger Reserve.

Images were considered independent when they were at least 30 minutes apart (Rovero and Zimmerman, 2016; Allen et al., 2018, 2020). We calculated the photographic capture rate by dividing the number of independent captures by the total number of camera trap nights (effort) and expressed it per 100 trap nights (Carbone et al., 2001) for each site. We then ran 999 bootstrap samples of the capture rate to estimate mean capture rates and bootstrapped standard error (SE) using the mosaic package (Prium et al., 2017).

We used the activity package (Rowcliffe, 2022) in R to analyze and visualize the temporal activity pattern of the Asian Small-clawed Otter.

## RESULTS AND DISCUSSION

Twenty independent photo-captures of the Asian Small-clawed Otter were recorded from five locations in Chandoli National Park (the southern part of the tiger reserve), viz. Karde backwater, Siddheshwar stream, Ramnadi stream, Gothane stream, and stream near Vetti kuti at an elevation range of 624 m to 911 m above sea level (Table 1; Fig 1,2) with a photographic capture rate of 0.94 ( $\pm$  0.57 SE). The Asian Small-clawed Otters were recorded in groups of 1–5 individuals, including pups. In addition, three other locations, viz. Ram nadi, Kandhar waterfall, and stream near Chandel kuti were confirmed with otter presence through sign surveys (spraints) (Fig. 3). We found the peak activity of the Asian Small-clawed Otter in the evening at around 1800 hours (Fig. 4).

**Table 1.** Details of camera trap images of the Asian small-clawed otter in Sahyadri Tiger Reserve

Date	Time (hh:mm)	Range	Site ID*
03-Nov-21	19:02	Chandoli	01
08-Nov-21	17:21	Chandoli	01
08-Nov-21	19:23	Chandoli	01
10-Nov-21	4:28	Chandoli	01
11-Nov-21	1:55	Chandoli	01
14-Nov-21	19:58	Chandoli	02
15-Nov-21	7:21	Chandoli	01
15-Nov-21	17:32	Chandoli	01
18-Nov-21	20:36	Chandoli	01
20-Nov-21	9:21	Chandoli	01
22-Nov-21	16:28	Chandoli	01
23-Nov-21	16:31	Chandoli	01
25-Nov-21	7:40	Chandoli	01
27-Nov-21	11:58	Chandoli	01
01-Dec-21	6:06	Chandoli	01
03-Dec-21	22:30	Chandoli	01
12-Dec-21	4:06	Chandoli	03
15-Feb-22	00:31	Helwak	04
22-Mar-22	3:23	Chandoli	05
26-Mar-22	17:05	Chandoli	05

\*Site ID: Gothane stream (ID-01), Stream near Vetti kuti (ID-02), Ram nadi stream (ID-03), Siddheshwar stream (ID-04), Karde Backwater (ID-05)



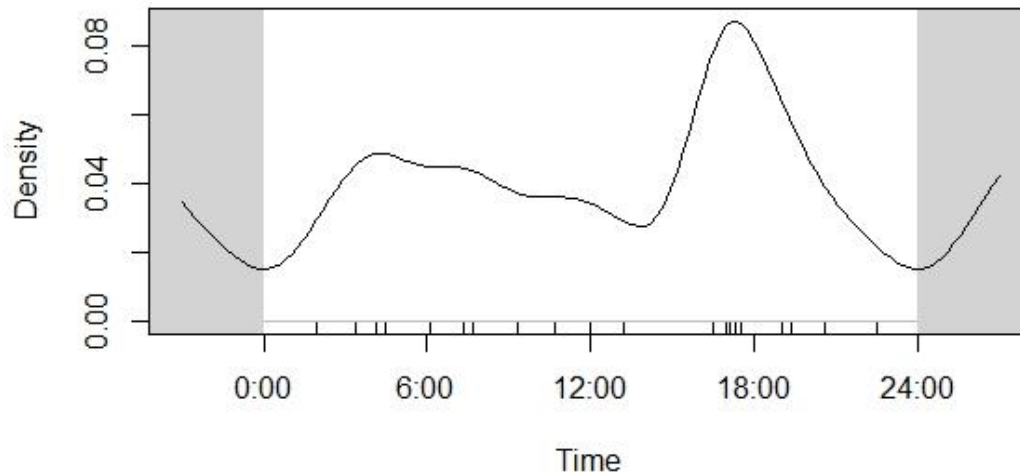
**Figure 2.** A: Camera trap image of Asian Small-clawed Otter *Aonyx cinereus* with pups along the stream; B: Camera trap image of Asian Small-clawed Otters *Aonyx cinereus*; C, D: Riparian and stream habitat used by Asian Small-clawed Otter *Aonyx cinereus* in Sahyadri Tiger Reserve

As pups were photo-captured, these images represent the first confirmed breeding record of the Asian Small-clawed Otters in the tiger reserve. However, incidental photo-captures of otters had been recorded previously from the tiger reserve (pers. obs. SNJ). This finding strengthens the species profile of the tiger reserve. This paper is a significant contribution to filling some of these knowledge gaps about the distribution of Asian Small-clawed Otter in the Sahyadri. Previously, the Asian Small-clawed Otters was first documented from the northern Western Ghats landscape and Maharashtra by Punjabi et al. (2014).



**Figure 3.** A, B: Indirect evidence (spraint) of Asian Small-clawed Otter *Aonyx cinereus* in Sahyadri Tiger Reserve.

The importance of riparian forests in the lives of semi-aquatic mammal species such as otters is reiterated. These forest and stream habitats provide otters with the necessary cover and food resources and are vital constituents of the terrestrial-aquatic continuum. The presence of Chandoli and Koyna reservoirs makes riparian forests a dominant forest type in the tiger reserve. Jelil et al. (2021) recorded 19 terrestrial mammals along the riparian forests of Koyna Wildlife Sanctuary, the northern part of Sahyadri. They further found that ungulates had the highest occupancy in these riparian forests. This breeding record of the Asian Small-clawed Otter proves an obligate riparian species' presence and growing population in reserve.



**Figure 4.** Activity graph of Asian Small-clawed Otter *Aonyx cinereus* in Sahyadri Tiger Reserve

Finally, this finding further demonstrates the advantages of using camera traps in wildlife studies. Camera traps in the tiger reserve have been deployed as part of regular monitoring activities and are majorly aimed at large carnivores such as tigers and leopards. However, camera traps provide data on target species and substantial data on non-target species (Edwards et al., 2018; Mazzamuto et al., 2019). Incorporating such by-catch data provides additional insights into a particular area's overall species inventory and species ecology.

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## RÉSUMÉ

### PREMIERE SYNTHÈSE SUR LA REPRODUCTION DE LOUTRE CENDRÉE *Aonyx cinereus* (ILLIGER, 1815) DANS LA RÉSERVE DES TIGRES DE SAHYADRI, AUX GHATS OCCIDENTAUX, EN INDE

La réserve des Tigres de Sahyadri est un complexe très peu étudié du paysage des Ghâts occidentaux de l'Inde. La présence d'habitats divers et hétérogènes favorise un regroupement d'espèces diversifiées. Nous relatons ici la présence et la reproduction de loutres cendrées dans la réserve des Tigres à l'aide de pièges photographiques adaptés entre novembre 2021 et mars 2022 sur des sites sélectionnés le long des cours d'eau. Des loutres cendrées ont été observées sur cinq sites avec un taux de capture photographique de 0,94 ( $\pm 0,57$  SE) et des groupes de 1 à 5 individus, y compris les loutrons. Cependant, des études approfondies sont nécessaires pour générer des estimations fiables de l'abondance et pour comprendre clairement les schémas de répartition des loutres dans ce paysage.

## RESUMEN

### PRIMER REGISTRO DE REPRODUCCIÓN DE NUTRIA DE UÑAS PEQUEÑAS ASIÁTICA *Aonyx cinereus* (ILLIGER, 1815) DE LA RESERVA DE TIGRES SAHYADRI, GHATS OCCIDENTALES, INDIA

La Reserva de Tigres Sahyadri es un complejo muy poco estudiado, en el paisaje de los Ghats Occidentales de la India. La presencia de hábitats diversos y heterogéneos da sostén a un ensamble diverso de especies. Aquí, informamos la ocurrencia y reproducción de Nutrias de Uñas Pequeñas Asiáticas en la reserva de tigres, a través de trampeo con cámaras realizado en forma oportunística, entre Noviembre 2021 y Marzo 2022, en locaciones muestreadas a lo largo de arroyos. Fueron registradas Nutrias de Uñas Pequeñas Asiáticas en cinco localizaciones, con una tasa de captura fotográfica de 0.94 ( $\pm 0.57$  SE) y en tamaños de grupo de 1-5 individuos, incluyendo crías. Sin embargo, se necesitan relevamientos extensivos para generar estimaciones confiables de abundancia y comprender los patrones de distribución de las nutrias en éste paisaje.

**सार :** सह्याद्री टाइगर रिजर्व भारत के पश्चिमी घाट का काफी कम अध्ययन किया गया परिक्षेत्र है। विविध और विषम आवासों की उपस्थिति विविध प्रजातियों के संयोजन का समर्थन करती है। हमने इस टाइगर रिजर्व में नवंबर 2021 से मार्च 2022 तक कुछ नदी के किनारे के स्थानों पर कैमरा ट्रैपिंग की तथा हमने एशियाई छोटे पंजो वाले ऊदबिलाव की उपस्थिति तथा प्रजनन का वर्णन किया। एशियाई छोटे पंजे वाले ऊदबिलाव को हमने पांच जगहों पर 0.94 ( $\pm 0.57$ ) फोटोग्राफिक कैप्चर रेट एवं 1 - 5 के समूह में बच्चों के साथ पाया। हालांकि, इनकी विश्वसनीय अनुमानित संख्या एवं ऊदबिलावों के इस परिदृश्य में विचरण के स्वरूप का पता लगाने के लिए और अधिक सर्वेक्षण की अति आवश्यकता है।



सारांश: सह्याद्री व्याघ्र प्रकल्प हा भारताच्या पश्चिम घाटाच्या प्रदेशातील अत्यंत कमी अभ्यासलेला भूभाग आहे. या ठिकाणी असलेल्या वैविध्यपूर्ण आणि विषम अधिवासांची उपस्थिती विविध प्रजातींच्या संमेलनास साथ देते. येथे, आम्ही नोव्हेंबर २०२१ ते मार्च २०२२ या कालावधीत जंगलातील प्रवाहाच्या बाजूने प्राथमिक सर्वेक्षण केलेल्या ठिकाणी कॅमेरा ट्रॅपिंगद्वारे व्याघ्र प्रकल्पात (Asian Small-clawed Otters) आशियाई लहान-नखे असलेल्या ओटर्सच्या प्रजातीची उपस्थिती आणि प्रजननाचे पुरावे नोंद केले आहेत. ०.९४ ( $\pm$  ०.५७ SE) च्या फोटोग्राफिक कॅप्चर रेटसह आणि १-५ पिल्लांसह पाच ठिकाणांहून एशियन स्मॉल-क्लॉड ओटर्स चा रेकॉर्ड केले गेले आहेत. तसेच, या प्रजातीच्या विपुलतेचे विश्वसनीय अंदाज तयार करण्यासाठी आणि या प्रदेशात ओटर्सचे वितरण नमुने स्पष्टपणे समजून घेण्यासाठी विस्तृत सर्वेक्षणेची आवश्यकता आहे.