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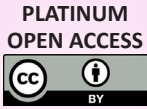
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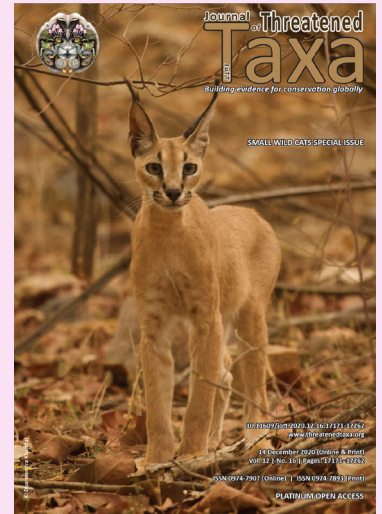
COMMUNICATION

THE RUSTY-SPOTTED CAT *PRIONAILURUS RUBIGINOSUS* (I. GEOFFROY SAINT-HILLAIRE, 1831) (MAMMALIA: CARNIVORA: FELIDAE) IN RAJASTHAN, INDIA – A COMPILATION OF TWO DECADES

Satish Kumar Sharma & Meenu Dhakad

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The Rusty-spotted Cat *Prionailurus rubiginosus* (I. Geoffroy Saint-Hillaire, 1831) (Mammalia: Carnivora: Felidae) in Rajasthan, India – a compilation of two decades

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Abstract: In Rajasthan, the presence of the Rusty-spotted Cat *Prionailurus rubiginosus* was first reported in 1994 in Udaipur District, the southernmost district of Rajasthan. Since then, it was also recorded in four more districts scattered over an area of about 86,205 km². We compiled information about the occurrence of the Rusty-spotted Cat in Rajasthan based on direct sightings, road kills, rescued kittens, and camera trap images. Our data set shows that the Rusty-spotted Cat is also present in eight more districts of Rajasthan that form part of the Aravalli Hills and Vindhyan Hills in the semi-arid zone of eastern Rajasthan. The area encompassed by these records amounts to 71,586 km². Kittens were rescued in six instances. Adult cats were recorded in 45 instances including 41 live cats and four roadkills. Ten adult live Rusty-spotted Cats were sighted in the mornings, and 31 were recorded after dark between late evenings and early mornings. They were recorded in eight habitat types including foremost thorny and dry deciduous forests, but also ravines and agricultural fields adjacent to forests, and in forest patches in the vicinity of human settlements. The preservation of forests is of utmost importance for the long-term viability of the Rusty-spotted Cat. We strongly recommend surveys outside protected areas to determine the connectivity between Rusty-spotted Cat population units in Rajasthan.

Keywords: Aravalli Hills, camera trapping, distribution, sightings, small wild cat, Vindhyan Hills.

सारांश: राजस्थान के दक्षिणी चोर पर स्थित उदयपुर जिले में 1994 में रस्टी-स्पॉटिड कैट (*Prionailurus rubiginosus*) की प्रथम उपस्थिति दर्ज की गयी थी। इसके बाद 86,205 वर्ग किमी क्षेत्र में फैले चार और जिलों में इसकी उपस्थिति दर्ज हुई। तत्पश्चात हमने राजस्थान में इसकी उपस्थिति जानने हेतु प्रत्यक्ष अवलोकन, सड़क पर दुर्घटना में मार गए, विपदा में फसे बचाये बिलौटे तथा कैमरा ट्रैप में दर्ज हुए प्राणियों के चित्र इकट्ठे किये गए। हमारे द्वारा संगृहीत तथ्यों से यह स्पष्ट हुआ है की रस्टी-स्पॉटिड कैट राजस्थान के आठ और जिलों में भी उपस्थित है, जो अरावली एवं विंध्यन पर्वतमाला तथा पूर्वी राजस्थान के अर्ध-शुष्क क्षेत्र हैं। जिन क्षेत्रों में इस बिल्ली की उपस्थिति दर्ज हुई है उनका फैलाव 71,586 वर्ग किमी क्षेत्र तक है। अद्यतन के दौरान छह बार बिलौटे बचाये गए। वयस्क बिल्लियां 45 बार दर्ज की गयी जिनमे 41 जीवित तथा चार सड़क दुर्घटना में मृत पायी गई। दस व्यस्क जीवित बिल्लियों सुबह देखि गयी एवं 31 अंधेरे के समय देर शाम और शुरुआती सुबह में देखि गई। ये बिल्लियां आठ प्रकार के आवासों में देखी गईं, जिनमें कांटेदार और शुष्क पर्णपाती वन सबसे प्रमुख हैं, लेकिन ये कंदरा क्षेत्र, वनों के निकट स्थित कृषि क्षेत्र एवं मानव आबादियों के पास स्थित वन कुंजों में भी देखी गईं। रस्टी-स्पॉटिड कैट के दीर्घकालीन बचाव हेतु वन संरक्षण सबसे जरूरी है। हम राजस्थान में रस्टी-स्पॉटिड कैट की संख्या इकाइयों के सम्बन्ध को निर्धारित करने हेतु संरक्षित क्षेत्रों के बाहर इसके सर्वेक्षण की पुरजोर अनुशंसा करते हैं।

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For **Author details** and **Author contribution** see end of this article.

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INTRODUCTION

The Rusty-spotted Cat *Prionailurus rubiginosus* is native to India, Sri Lanka, and southern Nepal (Pocock 1939; Nowell & Jackson 1996; Prater 1998; Kittle & Watson 2004; Appel 2016; Lamichhane et al. 2016). Across its range, it is closely associated with forest habitats (Nowell & Jackson 1996; Mukherjee 1998; Patel 2006; Appel 2016; Lamichhane et al. 2016; Nimalrathna et al. 2019; Bora et al. 2020; Chatterjee et al. 2020). Since 2016, it is listed as Near Threatened on the IUCN Red List of Threatened Species (Mukherjee et al. 2016). For decades, the knowledge about its distribution was based on anecdotal sightings in Jammu & Kashmir (Chakraborty 1978), Madhya Pradesh (Digveerendrasingh 1995), Odisha (Acharjyo et al. 1997), Maharashtra (Dubey 1999; Athreya 2010), Gujarat (Digveerendrasingh 1987; Pathak 1990; Singh 1998; Chavan et al. 1999), Rajasthan (Tehsin 1994; Sharma 2007), Karnataka (Kumara & Singh 2007), Tamil Nadu (Pillay 2008), and Andhra Pradesh (Manakadan & Sivakumar 2006; Behera 2008). Since camera traps are widely used in wildlife surveys, it was photographed in multiple locations in Uttar Pradesh (Anwar et al. 2010, 2012), Haryana (Ghaskabdi et al. 2016), Chhattisgarh (Basak et al. 2018), and Punjab (Kanwar & Lomis 2020).

In Rajasthan, the Rusty-spotted Cat was first reported in the outskirts of Udaipur City, where an individual was killed on a road passing through a forest patch (Tehsin 1994; Sharma 1999). Several sightings in subsequent years confirmed its presence in the vicinity of Udaipur (Bhatnagar et al. 2000; Sharma et al. 2006; Sharma 2007). Rusty-spotted Cats were also sighted in two tiger reserves of the state, namely Sariska (Sharma 1998; Mukherjee 1998, 2013) and Ranthambhore (Reddy 2002; Verma 2008; Khandal & Khandal 2015) in Alwar and Sawai Madhopur Districts, respectively. A road kill was reported in Bundi District (Nayak et al. 2017), and sightings in Bharatpur District (Singh et al. 2017).

Large forest tracts in India lie outside protected areas and are subject to conversion for other land uses, a development that negatively impacts the Rusty-spotted Cat population in the country (Mukherjee et al. 2016). To conserve vital forest habitat in Rajasthan, it is important to understand how well the Rusty-spotted Cat is established throughout the state; however, nothing is known to date about its presence in other districts of the state. We address this knowledge gap by providing new information about the occurrence of Rusty-spotted Cat across Rajasthan. Our collation consists of direct sightings, road kills, rescues and camera trap records obtained between August 2000 and March 2020.

STUDY AREA

Rajasthan is the largest state in India, with an area of 342,239km² in the north-western part of the country (Roy & Jakhar 2002). In the north-west, Rajasthan is bordered by Pakistan, in the north and north-east by the Indian states of Punjab, Haryana and Uttar Pradesh, in the east by Madhya Pradesh and in the south by Gujarat (Roy & Jakhar 2002). The most striking geological feature of Rajasthan is the Aravalli Hills, spanning at least 2,500 million years of the Earth's history (Roy & Purohit 2015). The Aravalli Hills intersect Rajasthan from north-west to south-east over about 800km and are bounded by the Thar Desert in the west and the Vindhyan Plateau in the east (Roy & Jakhar 2002). The average elevation of the Aravalli Hills is 550–670 m, with the highest peak rising to 1,722m (Roy & Jakhar 2002). The main forest types in Rajasthan are dry deciduous forest covering 12,850km², thorn forest in 2,536.5km², dry savannah in 593.5km² and broad-leaved hill forest in 153.8km² (Krishna & Reddy 2012). Forests are classified into three categories, viz., reserve forest, protected forest, and un-classed forest as per provisions of Rajasthan Forest Act, 1953 (Government of Rajasthan 1953). Sariska, Ranthambhore, and Mukundara Hills National Parks are managed under Project Tiger (Bhardwaj & Sharma 2013; Singh & Reddy 2016). Except Desert National Park and Tal Chhapar, all the other protected areas of the state are either confined to the Aravalli Hills or east of this hill range (Sharma 2006).

While pursuing the study, a particular focus was given to Udaipur's surrounding districts, where the Rusty-spotted Cat was first observed, namely Rajasmand, Banswara, Dungarpur, Pratapgarh, Pali, Sirohi, Chittorgarh, and Bhilwara.

The northern and central Aravalli Hills from Alwar to Ajmer Districts have *Anogeissus pendula*, *Acacia senegal*, and *Acacia catechu* forests on hilly slopes, while *Boswellia serrata* forests are confined towards upper reaches (Champion & Seth 1968; Mathur 1996; Sharma & Koli 2014). Patches of thorny forest and *Euphorbia caducifolia* bushes are present in drier areas (Champion & Seth 1968; Mathur 1996; Bhandari 1990; Sharma 2011). The southern Aravalli Hills support mostly mixed forests, Teak *Tectona grandis* forests, *Anogeissus latifolia* forests and dry bamboo breaks (Champion & Seth 1968; Mathur 1996; Sharma 2011). *Butea monosperma* forests are confined to foothills (Champion & Seth 1968; Mathur 1996; Sharma 2011). *Anogeissus pendula* and *Acacia catechu* forests are also present in the Vindhyan Hills (Champion & Seth 1968; Mathur 1996).

The climate in the Thar Desert of western Rajasthan is characterized by extreme temperatures and drought with cold winters and freezing temperatures (Bhandari 1990). January is the coldest month with average mean temperatures ranging from 12°C to 17°C (Sharma & Tiagi 1979). Mean monthly temperatures in April to June vary from 34–40°C in the west of the Aravalli Hills to 28–32°C in the south (Sharma & Tiagi 1979; Shetty & Singh 1987). Diurnal temperatures rise to 32°–47°C in May and June, which are the hottest months (Sharma & Tiagi 1979). The south-east Asian monsoon brings rain during the months of June to September (Prakash et al. 2015), varying from 100–400mm in the west (Bhandari 1990; Sharma 2011) to over 1,300mm in the east (Prakash et al. 2015). Mount Abu in the southwestern part of the Aravalli Hills is the only hill station of the state, and receives a maximum rainfall of 700–1,250 mm per year (Bhandari 1990; Shetty & Singh 1987; Sharma 2002).

MATERIAL AND METHODS

Opportunistic and sometimes planned surveys were conducted across Rajasthan from 2000 to 2020: to collect the data related to occurrence of the species, the following methods were adopted; direct sightings, rescue, road kill, and camera trap records. The first author was an officer of the Rajasthan Forest Department and worked in various districts. Whenever a Rusty-spotted Cat was encountered during patrolling and routine duties, notes were made about the date and time, location, surrounding habitat, sex of the individual, and its activity at the time of sighting. Camera trap records include those obtained by the Rajasthan Forest Department and by Tiger Watch, an organisation that has been working in Ranthambhore Tiger Reserve since 1997. Tiger Watch runs a program called Village Wildlife Volunteers (VWV) in collaboration with the Rajasthan Forest Department. VWV have been installing Cuddeback Attack camera traps in the peripheral areas of the reserve since 2015. The camera traps are mounted at 45–50 cm above ground on trees or poles along mud roads, animal trails and dry stream beds at a distance of 1–1.5 km between locations. All locations are situated in forest, grassland and ravine habitats. They are active only by night for 12 hours and are set to trigger images with a minimum delay of five seconds. VWV check them daily to download data, ensure proper functioning and replace drained batteries. The coordinates of locations are determined using a Garmin eTrex device. Until April 2020, camera traps were deployed at 200 locations in

an area of 2,000km² amounting to 79,310 camera trap nights.

We defined three age groups, namely kittens with closed eyes (I1), kitten with eyes opened (I2), and adults (A). When possible, we measured body length from snout to vent (BL), tail length from anus to tip of the tail (TL) and weight (Wt) of rescued cats, and determined their sex as female (F) or male (M) by close observation of their external sex organs. The sex identification of directly sighted and photographed animals remained unknown (UN).

RESULTS

We report 51 records of the Rusty-spotted Cat in 30 locations across 13 districts of Rajasthan (Fig 1; Table 1). These records comprise 21 direct sightings (41.18% of all records), 20 camera trap images (39.22%), six rescues (11.76%) and four road kills (7.84%). The cats were recorded in thorny and dry deciduous forest at 17 locations (56.67% of all), and in the outskirts of human settlements at five locations (16.67%). Two locations (6.67%) were in ravines and two (6.67%) in agricultural fields adjoining forest areas. One each was in Teak forest, broad-leaved semi-evergreen hill forest, a fruit orchard and a public park in a densely populated human habitation (3.33% respectively). The area encompassed by the 30 locations of these records amounts to 71,586km².

Kittens were rescued in six instances (11.8% of all records), all of them in the mornings. Adult cats were recorded in 45 instances (88.2%), including 41 live cats (80.4%) and four found killed on roads (7.8%). The live adult cats were recorded by day between 06.09h and 11.56h in 10 instances (24.4% of all live cats) and after dark between 19.00h and 05.29h in 31 instances (75.6%).

DISCUSSION

Our compilation of records shows that the Rusty-spotted Cat inhabits thorny and dry deciduous forest tracts in the Aravalli and Vindhyan Hills from the districts of Jaipur in the north to Banswara in the very south. We did not learn of any sightings in Thar Desert to the west of the Aravalli Hills, although the first author used to work there. It is neither included in the faunal list of the Thar Desert (Prakash 1963, 1964). We therefore assume that it is absent in this part of Rajasthan due to

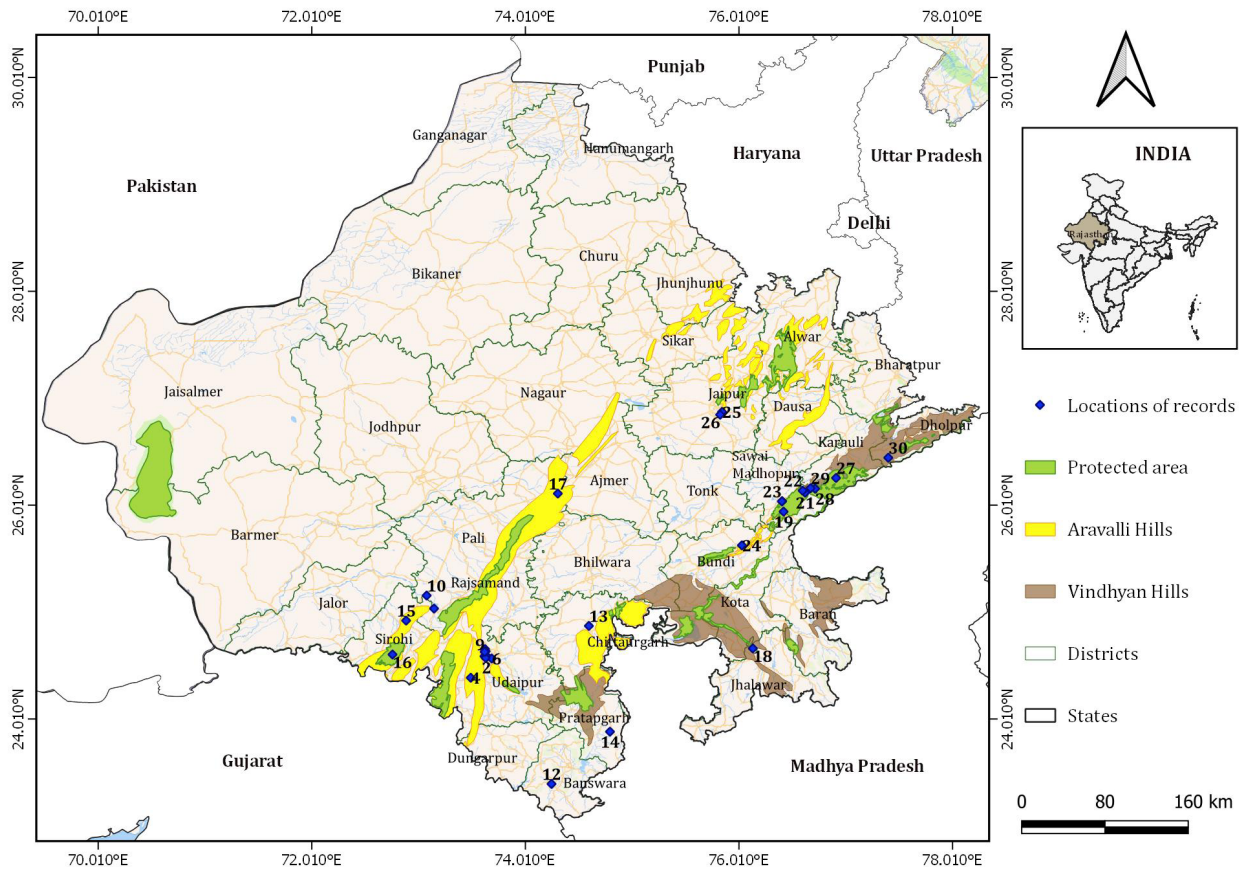


Figure 1. Records of the Rusty-spotted Cat in Rajasthan.



Image 1. Rusty-spotted Cat recorded on 14 October 2018 in Jaipur District, Rajasthan. © Jaipur Forest Department



Image 2. Rusty-spotted Cat found dead beside road on 27 October 2019 in Jaipur District, Rajasthan. © Nirav Bhatt

the arid climate with sand dunes and sparse vegetation. However, we think it possible that it may be recorded in future in this area as the habitat is expected to change from xeric to mesic due to the construction of the Indira Gandhi Canal (Prakash 1986; Chandrakasan et al. 2010).

We did not learn of any records in the districts of Dausa, Tonk, Rajsamand, Bhilwara, Baran, and Jhalawar in the east of the Aravalli Hills, despite the presence of dry deciduous forest. Rajsamand, Baran, and Jhalawar

Table 1. Records of the Rusty-spotted Cat based on direct sighting (D), camera trap image (C), rescue (R), road kill (K) in Rajasthan. Numbers in the table correspond to numbers in Figure 1.

| No. on map | Date and time | Type of record | Age and sex | Location | Habitat at location | Activity of the cat at the time of observation |
|---------------------|----------------------|----------------|--|---|--|---|
| Udaipur District | | | | | | |
| 1 | 19.viii.2000, 15.00h | D | A, M | Foothills of Thur Magra forest block, Udaipur East Forest Range near Fateh Sagar Lake | Thorny and dry deciduous forest dominated by <i>Acacia senegal</i> , <i>A. leucophloea</i> and <i>Boswellia serrata</i> | It was injured and sick. It was captured, kept in Gulab Bagh Zoo, treated and released on 25.viii.2000 in the same habitat. |
| 2 | 10.xi.2007, 08.30h | R | I2, F BL 21cm, TL 9cm | Gorella village near Udaipur City | Fruit orchard amidst a hilly forest | The kitten was wailing continuously |
| 3 | 16.iii.2008, 20.00h | D | A, UN | Foothills of Sajjangarh Wildlife Sanctuary | Thorny and dry deciduous forest | A single individual sitting on a 0.60m high boundary parapet wall of the sanctuary |
| | 1.vii.2008, 19.00h | D | A, UN | | | A single individual crossed the road |
| | 2.viii.2008, 22.00h | D | A, UN | | | A single individual was sitting on a 0.60m high boundary parapet wall |
| | 22.viii.2008, 21.00h | D | A, UN | | | A single individual walked on the road near the sanctuary |
| | 5.xii.2008, 23.00h | D | A, UN | | | A single individual at a carcass dump in outskirts of Sajjangarh Wildlife Sanctuary |
| | 7.vi.2009, 20.00h | D | A, UN | | | A single individual fed on a trampled <i>Calotes versicolor</i> on the road near sanctuary |
| | 30.viii.2011, 20.30h | D | A, UN | | | A single individual and a Leopard <i>P. pardus</i> were sitting on the same boundary wall of the forest at a distance of only 50m from each other |
| 13.iii.2014, 21.00h | D | A, F | A single individual was sitting on a 0.60m high boundary parapet wall of the sanctuary | | | |
| 4 | 18.iv.2008, 16.00h | K | A, F | Near village Surana on Ubheshwar – Jhadol road | Agriculture fields adjacent to forest areas | Roadkill |
| 5 | 14.x.2008, 19.35h | D | A, UN | Eastern part of Sajjangarh Wildlife Sanctuary | Thorny and dry deciduous forest dominated by <i>Boswellia serrata</i> | A single individual sitting on the boundary wall of the sanctuary |
| | 7.i.2009, 20.00h | | | | | |
| | 17.iii.2009, 21.45h | | | | | |
| | 16.vi.2009, 21.45h | | | | | |
| 6 | 11.ii.2009, 19.45h | D | A, UN | Gulab Bagh, Udaipur | Public park inside densely populated human habitation | A single individual crossed the road and climbed a <i>Cassia fistula</i> tree. Several sightings in the zoo premises |
| 7 | 13.ix.2009, 08.00h | K | A, F | Chunaveri Kaler Forest Block, near village Gorela | Thorny and dry deciduous forest dominated by <i>Acacia senegal</i> , <i>A. leucophloea</i> , <i>A. catechu</i> , <i>Ziziphus nummularia</i> and <i>Boswellia serrata</i> | A road kill on Ubheshwar road. During post mortem, a full developed female embryo was found in the uterus |
| 8 | 5.v.2010, 20.00h | D | A, UN | Tirol Village near Dhol-Kamol, Tehsil Gogunda | Outskirts of human habitation | A single individual in a fallow agricultural field |
| 9 | 3.iii.2014, 08.00h | D | A, F | Foothills of Thur Magra forest block, Udaipur Forest Range near Fateh Sagar Lake | Thorny and dry deciduous forest dominated by <i>Acacia senegal</i> , <i>A. leucophloea</i> and <i>Boswellia serrata</i> | A single individual crossed the road. The stretch of road is generally busy with sharp curves, often prone to accidents |
| Pali District | | | | | | |
| 10 | 19.viii.2012, 08.30h | K | A, UN | Sumerpur | Outskirts of human habitation | Roadkill observed by Parbat Singh Champawat, Forest Range Officer, pers. comm. 19.viii.2012 |
| 11 | 19.iv.2016, 20.30h | D | A, UN | Dudni village, near Jawai Dam | Thorny and dry deciduous forest dominated by <i>Prosopis juliflora</i> | An individual crossed the road, photographed by Deputy Conservator of Forests Balaji Kari |

| No. on map | Date and time | Type of record | Age and sex | Location | Habitat at location | Activity of the cat at the time of observation |
|-------------------------|---------------------|----------------|---|--|--|---|
| Banswara District | | | | | | |
| 12 | 19.xi.2010, 08.30h | R | I2, M, F | Bhagtol Forest Block, Range Ghatol | Teak forest | Two wailing kittens in the forest without mother in sight. After waiting the whole day for their mother to return, the forest staff eventually rescued and fostered the kittens. One died on 21.xi.2010 and another on 25.xi.2010 |
| Chittaurgarh District | | | | | | |
| 13 | 15.ix.2013, 09.00h | R | I1, F BL 14.5cm, TL 5.5cm, Wt. 96g | Chittaurgarh | Outskirts of human habitation | One abandoned wailing kitten was found in the outskirts of the city |
| Pratapgarh District | | | | | | |
| 14 | 22.x.2014, 10.00h | R | I2, UN | Arnod | Agriculture fields adjoining forest | Two abandoned wailing kittens sighted by Forest Department staff |
| Sirohi District | | | | | | |
| 15 | 31.vii.2015, 10.00h | R | I2, UN | Sirohi | Thorny and dry deciduous forest dominated by <i>Acacia senegal</i> and <i>Anogeissus pendula</i> | An abandoned kitten brought to Udaipur zoo |
| 16 | 1.xii.2018, 21.00h | C | A, UN | Mount Abu | Broad-leaved semi-evergreen hill forest | 10 camera trap photos |
| Ajmer District | | | | | | |
| 17 | 30.vii.2016, 11.00h | R | I2, UN | Beawar | Thorny and dry deciduous forest dominated by <i>Acacia senegal</i> | Two abandoned wailing kitten sighted by the forest staff |
| Kota District | | | | | | |
| 18 | 11.x.2019, 06.19h | C | A, UN | Mashalpur forest block, Mukundara Hills National Park | Thorny and dry-deciduous forest | An individual recorded (T. Mohanraj pers. comm. 15.iii.2020) |
| Sawai Madhopur District | | | | | | |
| 19 | 8.v.2013, 20.30h | D | A, UN | Near Bodal Village | Outskirts of human habitation | An individual crossed the road and climbed an <i>Acacia leucophloea</i> tree (Dharmendra Khandal pers. comm. 15.iii.2020) |
| 20 | 16.xii.2014, 20.30h | D | A, UN | On the periphery of Ranthambore National Park near helipad | Thorny and dry deciduous forest dominated by <i>Anogeissus pendula</i> | An individual appeared to be searching for food, climbed a tree after being noticed (Dharmendra Khandal pers. comm. 15.iii.2020) |
| 21 | 24.v.2015, 11.18h | C | A, UN | Amalideh near Banas River | Ravines | An individual recorded by camera trap |
| 22 | 21.xi.2019, 05.10h | C | A, UN | Talda Village | Ravines | An individual recorded by camera trap |
| 23 | 11.i.2020, 20.30h | D | A, UN | Ranthambore National Park near helipad | Thorny and dry deciduous forest dominated by <i>Anogeissus pendula</i> | A single individual was sitting on boundary wall of the park (Dharmendra Khandal pers. comm. 15.iii.2020) |
| Bundi District | | | | | | |
| 24 | 20.ii.2019, 04.52h | C | A, UN | Near a perennial water source in Sakhawada area | Thorny and dry deciduous forest dominated by <i>Anogeissus pendula</i> , <i>Acacia</i> , <i>Grewia tenax</i> | An individual recorded by camera trap |
| Jaipur District | | | | | | |
| 25 | 14.x.2018, 05.29h | C | A, UN | Jhalana Leopard Safari Park | Thorny and dry deciduous forest dominated by <i>A. pendula</i> | An individual recorded by camera trap (Shri Sudarshan Sharma, Deputy Forest Officer, Wildlife, Jaipur, pers. comm. 15.iii.2020) (Image 1) |
| 26 | 27.x.2019, 15.00h | K | A, UN | Jhalana | Outskirts of human habitation | Roadkill observed by Nirav Bhatt pers. comm. 15.iii.2020 (Image 2) |

| No. on map | Date and time | Type of record | Age and sex | Location | Habitat at location | Activity of the cat at the time of observation |
|------------------|---------------------|----------------|-------------|---|---|---|
| Karauli District | | | | | | |
| 27 | 6.iii.2016, 20.30h | D | A, UN | Near Marmda ghati, Kailadevi Wildlife Sanctuary (KWS) | Thorny and dry deciduous forest with sparse <i>A. pendula</i> | An individual crossed the road and climbed a tree |
| 28 | 28.xi.2017, 11.56h | C | A, UN | Khaadka Ughena, KWS | Thorny and dry deciduous forest ~ 200m away from a seasonal stream | An individual recorded by camera trap (Image 3) |
| | 15.xi.2018, 06.09h | C | A, UN | | | |
| | 29.iii.2019, 11.00h | C | A, UN | | | |
| | 3.iv.2019, 01.33h | C | A, UN | | | |
| | 11.v.2019, 11.43h | C | A, UN | | | |
| | 3.vi.2019, 03.32h | C | A, UN | | | |
| | 7.x.2019, 04.57h | C | A, UN | | | |
| | 28.x.2019, 02.00h | C | A, UN | | | |
| | 1.xi.2019, 08.53h | C | A, UN | | | |
| | 7.xii.2019, 02.50h | C | A, UN | | | |
| 29 | 4.i.2020, 01.52h | C | A, UN | Tipkan ghati in KWS | Thorny and dry deciduous forest dominated by <i>A. pendula</i> | An individual recorded by camera trap |
| | 5.i.2020, 02.21h | C | A, UN | | | |
| Dholpur District | | | | | | |
| 30 | 20.ii.2020, 03.55h | C | A, UN | Dhamoh Khoh, near Sarmathura | Thorny and dry deciduous forest with <i>Capparis decidua</i> , <i>Boswellia serrata</i> , <i>Butea monosperma</i> , ~ 100m away from a stream | An individual recorded by camera trap |



Image 3. Rusty-spotted Cat recorded on 3 April 2019 in Karauli District, Rajasthan. © Tiger Watch

have protected forests, whereas forests in Dausa, Tonk, and Bhilwara are not protected. To date, no camera trapping survey was carried out in these forests. In view of our records of the Rusty-spotted Cat in thorny and dry deciduous forests in other parts of the Aravalli and Vindhyan Hills, we consider it likely that it will be recorded there as well in future surveys.

Most of the adult cats were recorded after dark, confirming the foremost nocturnal activity of the Rusty-spotted Cat observed in other study areas (Mukherjee 1998; Chavan et al. 1999; Kittle & Watson 2004; Kumara

& Singh 2007; Patel 2006; Anwar et al. 2010, 2012; Vyas & Upadhyay 2014; Aditya & Ganesh 2016; Ghaskadbi et al. 2016; Lamichhane et al. 2016; Basak et al. 2018). Cats sighted at night in Sajjangarh Wildlife Sanctuary, Jhalana Leopard Safari Park and Ranthambhore National Park, however, were resting, either sitting or walking on boundary and parapet walls. On one occasion, both Rusty-spotted Cat and Leopard were observed sitting on the same parapet wall at a distance of only 50m from each other. This observation was made in the rainy season when the ground was covered with thick and tall grasses, which may hinder the cat's vision on the ground. On one occasion, the cat was observed on Ronjh trees *Acacia leucophloea* and other thorny tree species. Ronjh is a thorny 6–8 m high tree with sharp stipular spines up to 3.5cm long (Shetty & Singh 1987). Despite the presence of spines on stem and branches, the cat was observed comfortably perched on a branch. These observations were in concurrence with the cat's semi-arboreal behaviour (Nowell & Jackson 1996; Kumara & Singh 2007; Vasava et al. 2012; Mukherjee & Koparde 2014), and preference for dense forest cover (Bora et al. 2020; Chatterjee et al. 2020).

We found nine kittens between July and November, indicating that females give birth in the warm season. Females under captive conditions also gave birth in January, April, and July to October (Dmoch 1997).

We found four Rusty-spotted Cats killed on roads in

20 years. Increased road networks and vehicular traffic may pose a threat, as road kills were also observed in other areas (Digveerendrasingh 1995; Dubey 1999; Behera 2008; Vyas & Upadhyay 2014; Adhikari et al. 2019). Especially at night, the cat was observed to venture on roads to scavenge on roadkills, which increases the risk of getting hit by vehicles. Significant preventive measures are required to prevent the Rusty-spotted Cat from falling victim to road accidents. Patrolling staff should be trained to check incidents of roadkills and dumped cattle carcasses and remove them from roads passing through forests. Other measures like proper waste disposal system from roadside hotels and small roadside food restaurants, provisions of culverts and underpasses at intervals on highways, water hole facilities away from the roads, and speed signs for drivers, may prevent roadkills of not just Rusty-spotted Cat but also of many other species crossing roads.

The Forest Department should initiate training for staff to identify the Rusty-spotted Cat correctly, so that sighting data can be compiled and reported in future. Intensive camera trap studies are needed in other districts and forests of the state to determine the connectivity between population units in Rajasthan. In view of loss and fragmentation of habitat being the most serious threat to the Rusty-spotted Cat (Mukherjee et al. 2016), it is imperative to preserve forest tracts. To date, little is known about the Rusty-spotted Cat's movement pattern, reproduction and diet in the wild. In-depth studies on these aspects of the Rusty-spotted Cat's ecology are essential to promote adequate conservation measures.

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