

Distribution Update

The lone wolf: new distribution update of the Indian grey wolf (*Canis lupus pallipes*) in southern India

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Abstract

The Indian grey wolf *Canis lupus pallipes* occupies a top predator niche in arid and semi-arid open plains and grasslands of India. It faces a series of threats including loss of grasslands to agriculture and industrial expansion, modification of habitats, depletion of its natural prey, retaliatory killing, and disease spread through feral dogs. Here we report a southernmost distribution extension for the Indian grey wolf in the district of Chamarajanagara in southwest India. Previous studies have not documented this species from the Cauvery Wildlife Sanctuary in Karnataka. The most recent distributional range of the Indian grey wolf to the current documentation is about 170km northwest, so our finding extends the southern limit of this subspecies. This record also documents the first photographic evidence of the Indian grey wolf from Chamarajanagara district, Karnataka. We assume that the documented grey wolf is a transient/dispersing individual, as previous large-scale sampling efforts have not documented the presence of this canid. The landscape in and around the Cauvery Wildlife Sanctuary has the potential to host small populations of Indian grey wolves due to the presence of suitable habitat and prey. However, conversion of grasslands and dryland agriculture to permanent, irrigated crops such as banana and sugarcane pose a threat through modification of habitat. Considering that grey wolves require large home ranges, it warrants adopting a landscape approach where a network of suitable habitats is available to conserve a healthy population. Since the Indian grey wolf is one of the least studied carnivore species in India, any new distributional information will help in conservation and management. Hence systematic and periodic occupancy surveys should be carried out to understand any changes in distribution so that colonisation, recolonisation, and local extinction can be scientifically monitored.

Introduction

Grey wolves (*Canis lupus*) are the largest species in the Canidae family and occupy relatively heterogeneous terrestrial habitats from forests and scrubland to dry arid grasslands and deserts (Mech 1974, Jhala and Giles 1991). They are also found in human-dominated landscapes depending on sufficient availability of prey and denning sites (Jhala 2003, Habib and Kumar 2007, Boitani et al. 2020). Grey wolves are relatively widespread and are currently found in 68 countries, including India (Boitani et al. 2020).

Ten subspecies are recognised across the distribution range of the grey wolf (Boitani et al. 2020, Werhahn 2020), two of which are found in India. Studies have suggested that grey wolves follow two independent lineages in India namely, the Himalayan or Tibetan wolf (*Canis lupus chanco*) found in the Trans-Himalayan region, and the Indian grey wolf (*Canis lupus pallipes*) which has a population spread throughout the arid and semi-arid regions of northern, western, central, parts of eastern, and peninsular India where it is one of the top predators (Aggarwal et al. 2003, Sharma et al. 2004). They

are found in isolated pockets in the states of Rajasthan, Haryana, Uttar Pradesh, Bihar, West Bengal, Jharkhand, Chhattisgarh, Madhya Pradesh, Gujarat, Odisha, Maharashtra, Telangana, Andhra Pradesh, and Karnataka (Shahi 1982, Jhala and Giles 1991, Kumar and Rahmani 1997, Jhala 2003, Singh and Kumara 2006, Sharma et al. 2019).

Karnataka is the southernmost limit of the grey wolf in India, and seems to be one of the strongholds of the subspecies. Singh and Kumara (2006) observed that in Karnataka, Indian grey wolves are quite widespread across the plains, with a population estimate of 555 wolves in an area of 123,330 km². They are reported to be found in 18 districts of the state with Mandya district being the southernmost limit of the subspecies (Singh and Kumara 2006, Figure 1).

The grey wolf is categorized as Least Concern in the IUCN Red List (Boitani et al. 2020). This is because the species *Canis lupus* is quite widespread globally with healthy metapopulations (Sharma et al. 2019). In India, the

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subspecies *Canis lupus pallipes* is protected under Schedule-I of The Wildlife Protection Act (1972). Locally, the main threats to the already depleting grey wolf populations in India are the lack of natural prey availability, retaliatory killing by humans, disease spread through feral dogs, and habitat loss due to agricultural and industrial expansions (Jhala 2003).

In Karnataka, there is a lack of systematic surveys specifically targeted to estimate and monitor the distribution and population of grey wolves. However, Singh and Kumara (2006) documented their distribution as a by-product of their work on large mammal distribution in Karnataka. Thus, any new information about the occurrence of the subspecies adds valuable data towards the understanding and conservation of the species. Here, we report the presence of the Indian grey wolf in an area where it has not been previously documented.

Methods

Study area

Cauvery Wildlife Sanctuary (CWS; 1,081 km²; Figure 1) lies within 11.9484°N–12.4098°N, 77.1596°E–77.7778°E. It falls under the Ramnagara, Mandya, and Chamarajanagara districts of Karnataka at the junction of the Western Ghats and the Eastern Ghats. CWS is part of a larger protected area (PA) network including Malai Mahadeshwara Wildlife Sanctuary (906 km²), Biligiri Rangaswamy Temple Tiger Reserve (574 km²), Satyamangalam Tiger Reserve (1,409 km²), Cauvery North Wildlife Sanctuary (504 km²), and other reserved forests (Gubbi et al. 2017a). The vegetation in CWS is characterised as woodland savannah, dry deciduous, and tropical dry thorn forests along with moist deciduous forests, riparian habitat along the river Cauvery, and other larger streams, and small patches of 'shola' (montane evergreen) forests (KFD 2004). The river Cauvery runs west to east through CWS, dividing the PA into two parts. The altitude of the study site ranges between 254 to 1,515 m asl and receives a mean annual rainfall of 750–800 mm. The temperatures vary from 15 °C to 42 °C. The villages and hamlets within CWS cover an area of about 66 km² (TORGCCCI 2001, RDPR 2011).

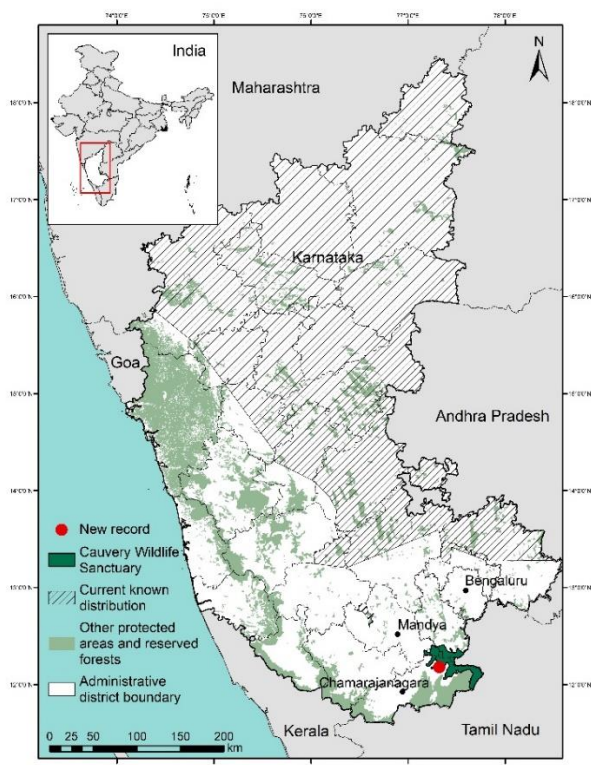


Figure 1. Previous known distribution range of the Indian grey wolf *Canis lupus pallipes* in Karnataka as per Singh and Kumara (2006) and current record in Cauvery Wildlife Sanctuary, Karnataka, India.

Observation

Camera-traps (Panthera V4 and V6) were deployed between March and July 2020 to estimate the density and abundance of leopards *Panthera pardus fusca* in CWS. A total of 490 camera-trap stations were selected covering different types of vegetation. At each station, two camera-traps were deployed at a height of approximately 40 cm from ground level on either side of animal trails and forest roads. The study area was divided into seven blocks and camera-traps were placed for 16 days in each block. The camera-traps were active throughout the day and night. The total amount of effort was 7,840 camera-trap days.



Figure 2. Indian grey wolf *Canis lupus pallipes* camera-trapped on the 7th April 2020 at Cauvery Wildlife Sanctuary, Karnataka, India.

Results

An Indian grey wolf was photographed once at the camera-trap location 12.180427°N, 77.323309°E with a measured elevation of 666m *a.s.l.* on 7th April 2020 at 04:47h. The camera-trap station was situated in the Kothnur range of CWS falling under Chamarajanagara district.

The individual photographed had sandy brown fur with black tips on the back and a long tail with a black tip (Figure 2). The dog-like appearance, long muzzle, and long limbs with large pads were good indicators of the species. The identification of the species was confirmed with the help of field guides (Menon 2014). The habitat of this location is characterized by dry deciduous forests and woodland savannah (Figure 3).



Figure 3. Typical habitat of the Cauvery Wildlife Sanctuary, Karnataka, India.

Discussion

This photographic evidence is the first record of the Indian grey wolf from this area. Importantly, this record establishes the southernmost limit of the grey wolf in India. Previous studies have not recorded the presence of the Indian grey wolf in the Chamarajanagara district (Neginhal 1981, Karanth 1994, Singh and Kumara 2006), and even studies that were specifically carried out in CWS have also not documented the grey wolf in this PA (Gubbi et al. 2017b) or in the entire landscape (Nicholson 1887, Neginhal 1981, Shahi 1982, Kumara et al. 2012).

The closest point in the distributional range of the Indian grey wolf to the current documentation is about 170 km northwest, so our finding extends the southern limit of this subspecies (Singh and Kumara 2006). Even though Indian grey wolves are mostly found in arid grasslands in the country, they are occasionally recorded in dry deciduous habitats such as Papikonda Wildlife Sanctuary in Andhra Pradesh, and Kanha and Pench Tiger Reserves in Madhya Pradesh (Ahmed et al. 2012, Majumdar et al. 2012, Shankar et al. 2019, Gubbi et al. this study).

The individual recorded inside CWS may be a dispersing/transient animal. Our camera-trap sampling effort during this study period, and in the past, collectively amounts to 24,930 days. Despite such efforts, there has been no earlier record of grey wolf presence in this area suggesting that this could be a transient individual.

Blackbucks (*Antelope cervicapra*) are an important prey species for grey wolves in some parts of the country (Jhala 2003, Jethva and Jhala 2004). During our 2018 camera-trap studies in CWS, blackbucks were photographed (Gubbi unpublished data). This might suggest that blackbucks are potential prey for grey wolves in this area. The diet of the grey wolf also comprises domestic livestock in agroforestry and human-dense landscapes (Jethva and Jhala 2004, Sharma et al. 2019). The area around CWS has a significant sheep and goat population, which might attract dispersing individuals as well. Furthermore, wild pigs (*Sus scrofa*), Indian hares (*Lepus nigricollis*), and rodents are all part of the grey wolf diet (Jethva and Jhala 2004), all of which are found both within and outside CWS. Hence, the landscape around CWS could possibly support a small grey wolf population, but the conversion of natural grasslands and dryland agriculture to crops that require permanent irrigation such as banana (*Musa sp.*) and sugarcane (*Saccharum sp.*) could permanently modify grey wolf habitat outside CWS. This could be a concern for the species locally and across the country where grey wolves currently are found.

The disappearance of grey wolves from an area of 31,801 km² in the southern plateau of Karnataka could be due to threats such as habitat loss, lack of natural prey availability, and retaliatory killings. Singh and Kumara (2006) speculated that the disappearance could also be attributed to the increasing number of leopards in the previously grey wolf occupied area. Management measures undertaken by the Forest Department included afforestation programmes and construction of small water bodies which led to increased forest cover and availability of water, possibly attracting leopards, and increasing competition for grey wolves (Singh and Kumara 2006).

This study documented the Indian grey wolf in Chamarajanagara district and thereby confirmed the presence of all four southern Indian canid species in the area, i.e. Indian grey wolf, Indian jackal (*Canis aureus*), Dhole (*Cuon alpinus*), and Bengal fox (*Vulpes bengalensis*), making CWS unique as it is possibly the only PA in Karnataka to document all the four large wild canids (Gubbi et al. 2017b). Though India's PA network is mostly directed towards forested habitats, it has some PAs (Velvadar National Park, Rollopadu Wildlife Sanctuary, Basur Amruth Mahal Conservation Reserve, etc.) where the grey wolf is the focus of protection. However, a few of the PAs that were designated to protect grey wolves have lost them, possibly due to erroneous management practices such as afforestation (Singh and Kumara 2006, Gubbi personal obs). Hence, management practices should be based on the ecology of the focal species, especially for habitat specialists, rather than generic approaches. The Indian grey wolf faces a serious threat due to unintentional loss of habitat and lack of awareness. Considering that Indian grey wolf home ranges can extend up to 300 km² (Jhala 2003), and that they have a high dispersal capability, it warrants that a landscape scale conservation approach is adopted where a network of suitable habitat is available to conserve a healthy meta-population of the species and its associated ecosystem.

For the protection and management of Indian grey wolves, a better understanding of its distribution and population status is also essential (Sharma et

al. 2019). Hence, systematic and periodic occupancy surveys should be carried out to collect information about the Indian grey wolf so that distribution changes (colonisation, recolonisation, and local extinction) can be scientifically monitored.

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Biographical sketch

Sanjay Gubbi has broad interests in the ecology and conservation of large carnivores, and in their interactions with humans. He has worked to bring about important changes for wildlife conservation in Karnataka, southern India. He is the recipient of the Whitley Award for his contribution to tiger conservation.

S. Ramesh is currently the head of Cauvery Wildlife Sanctuary and holds a PhD on the subject of reclamation and afforestation of previously mined areas. He is interested in understanding perceptions of communities and political leadership towards ecosystem services. His interests also include public attitude towards human-wildlife conflict.

Amrita M. Menon is a Master's graduate in Applied Ecology certified under the ERASMUS MUNDUS program. She received her Bachelor's in Environmental Science from the University of Birmingham. She has previously worked on species including frogs, sea turtles, and bats. She is broadly interested in conservation biology and population ecology.

M. N. Girish is a Master's graduate in Wildlife and Management from Kuvempu University which he pursued after his Bachelor's in Zoology. He has previously worked on the field aspect of population estimation studies which involved camera trapping. He is currently pursuing his interest of joining the Indian Forest Service.

H. C. Poornesha holds a Master's degree in Wildlife and Management. His interests lie in landscape ecology, large mammal conservation, and conservation policies. His analyses and mapping products have formed the core of numerous conservation planning efforts.