



Status survey on carnivores and prey in Kalesar National Park and Wildlife Sanctuary in Haryana, India

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Abstract

Abundance of carnivore and their prey reflects the habitat richness of an area. This is because carnivores occupy the top position in the food pyramid. However the survivability of carnivore depends upon the abundance of prey population in an area. Conservation of carnivore may not be practical until there is viable population of prey species. Therefore a survey was conducted to find out the presence of carnivore as well as their prey species in Kaleswar National Park (30° 18' to 30° 27' North latitude and 77° 25' to 77° 35' East longitude) and Wildlife Sanctuary (30° 16' to 30° 28' North latitude and between 77° 20' to 77° 37' East longitude) in Haryana, India. Nine trails were surveyed covering 32.2 km during February-April, 2012. A total of 23.8 km trail of the national park and 8.5 km of wildlife sanctuary were covering Guga and Kalesar beats in national park area and Faizpur, Tibriyan and Ambala beats in wildlife sanctuary area. Both direct sighting and indirect evidences (pugmarks, scrape, scat, kill remains etc.) were recorded. During the survey, the carnivores that were found are: leopard (*Panthera pardus*), jackal (*Canis aureus*), hyena (*Hyanea hyanea*) and fox (*Vulpes bengalensis*). On the other hand, no sign was found about the presence of tiger in Kalesar NP and WLS. Among prey, sambar (*Cervus unicolor*), spotted deer (*Axis axis*), barking deer (*Muntiacus muntjak*), chowsingha (*Tetracerus quadricornis*), wild boar (*Sus scrofa*) and elephants (*Elephas maximus*) were bring into being during survey. The survey supports the fact that the leopard is very common carnivore in both the parks. It was also confirmed from this study that tiger is not present in both Kalesar NP and WLS. Prey populations were abundant but might be not that enough to support major predator like tiger. However, it is good habitat for small carnivore.

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Introduction

Carnivores (eg. tiger, leopard, jackal, fox, hyena etc.) have been considered prophetic indicators of the overall fate of ecosystems due to their top-level trophic position (Crooks *et al.*, 2010; Estes *et al.*, 2001; Faeth *et al.*, 2005; Noss *et al.*, 1996). Its role as a top predator is vital in regulating and perpetuating ecological processes and systems (Sunquist *et al.*, 1999). They need large undisturbed landscapes with ample prey to raise young and to maintain long term genetic and demographic viability (Seidensticker and McDougal, 1993; Karanth and Sunquist, 1995). Hence they are considered not only a flagship species but also an umbrella species in conservation.

Habitat loss and fragmentation due to urbanization are among the primary threats to global biodiversity (McDonald *et al.*, 2008; McKinney, 2002). Mammalian carnivores tend toward large home ranges, low population densities, and slow population

growth rates, making them especially vulnerable to extinction brought on by habitat loss or human persecution (Gittleman *et al.*, 2001; Noss *et al.*, 1996). Therefore, carnivores can be useful as a tool to measure the relative health of ecosystems.

The National Tiger Conservation Authority (NTCA) of India under the Ministry of Environment and Forests, Government of India initiated survey and monitoring of tiger, other species of carnivore and their prey across India under the banner of “Status of Tigers, Co-predators and Prey in India” in 2005 and 2010 (Jhala *et al.*, 2011). Though the survey covered major tiger habitat across India, few area remained untouched. One of them is Kalesar National Park and Wildlife Sanctuary where no survey was done till date under NTCA. Therefore, this survey was undertaken to find out the abundance of different carnivores and their prey species in Kalesar NP and WLS of Haryana, India.

Table 1. Different beats of Kalesar NP & WLS where trails were laid.

Beat	NP/WLS	Trail (km)	Forest
Guga Beat	KNP	3	Closed forest
Kalesar Beat	KNP	4	Closed forest
Faizpur Beat	KWLS	3	Open forest
Kalesar and Guga Beats	KNP	5.3	Close forest
Kalesar Beat	KNP	4	Open and Shrub forest
Tibriyan Beat	KWLS	3.5	Open forest
Ambwala Beat	KWLS	2	Open forest
Kalesar Beat	KNP	4	Closed forest
Kalesar Beat	KNP	3.5	Closed forest

Materials and methods

The survey was conducted in Kalesar Wildlife Sanctuary (between 30° 16` to 30° 28` North latitude and between 77°20` to 77° 37` East longitude) and Kalesar National Park (located 30° 18` to 30° 27` North latitude and 77° 25` to 77° 35 East longitude) in Yamuna Nagar district of Haryana State. Both the protected areas are sharing the boundary with three states viz. Himachal Pradesh, Uttar Pradesh and

Uttrakhand. The Yamuna River form the Eastern boundary with Uttar Pradesh, the main Shiwalik ridge separates state boundary among Haryana, Himachal Pradesh and Uttrakhand in the north. The national park was notified on 8th December 2003 with an area of 11,570 acres while the sanctuary was notified on 13th December 1996 with an area of 13,029 acres. Both the protected area has number of water bodies (both natural and man-made) which provide wetland

habitat. There is mixed to dry deciduous forest cover with central tracts of Sal, *Shorea robusta*. The temperature in Haryana is very hot in summers where temperatures go up to even 46°C. But in the winter the region is quite cold. The rainfall in the region is low. The average daily relative humidity for April is around 46%.

Nine trails were surveyed covering 32.2 km. Among this, about 23.8 km trail of national park area and another 8.5 km of wildlife sanctuary was surveyed. Survey covered Guga and Kalesar beats in national park area and Faizpur, Tibriyan and Ambala beats in wildlife sanctuary area (Table 1). During survey, following data were collected during trail survey -

Tiger and other carnivores species

Animal trails were followed to find out the presence of signs (pugmarks, scrape, scat, kill remains etc.) of tiger and other predators. Sighting of any evidence was recorded GPS location with respect to species.

Prey abundance

Presence of indirect evidences or signs (pellet/ dung/ hoof mark/ scratch/ wallowing/digging) were counted in the sample plots to ascertain frequency of occurrence of the species and their distribution. Pellet group count was also done in the sample plots.

Results

Abundance of carnivores and prey

No sign of tiger was found in Kalesar NP & WLS during survey. But, leopard (*Panthera pardus*), jackal (*Canis aureus*), hyena (*Hyanea hyanea*) and fox (*Vulpes bengalensis*) were found during survey. Among prey, sambar (*Cervus unicolor*), spotted deer (*Axis axis*), barking deer (*Muntiacus muntjak*), chowsingha (*Tetracerus quadricornis*), wild boar (*Sus scrofa*) and elephants (*Elephus maximus*) were found during survey.

Though there was no sighting of carnivore, enormous number of indirect evidences was recorded during survey. Pug marks were the most common (76.3%)

means of indirect evidence followed by scat (15.8%), nesting or resting sign (5.3%) and hairs (2.3%) (Fig. 1). These clearly indicate that pugmarks were the common indirect evidences of carnivores during survey. Species wise abundance of different indirect evidence also showed similar trend (Fig. 2). This clearly indicates that pugmark is the most common indirect sign except fox.

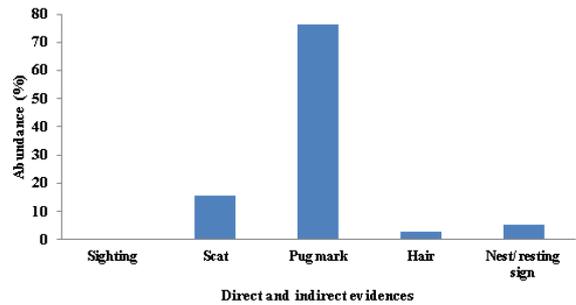


Fig. 1. Abundance of direct and indirect evidences of carnivore.

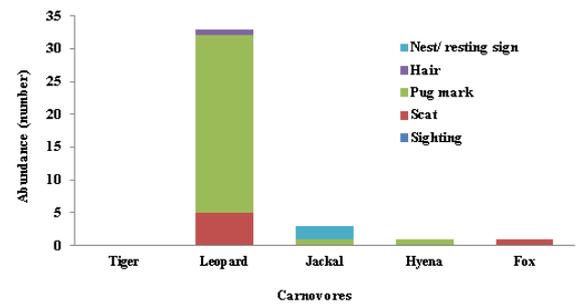


Fig. 2. Abundance of different carnivore species through direct and indirect evidences.

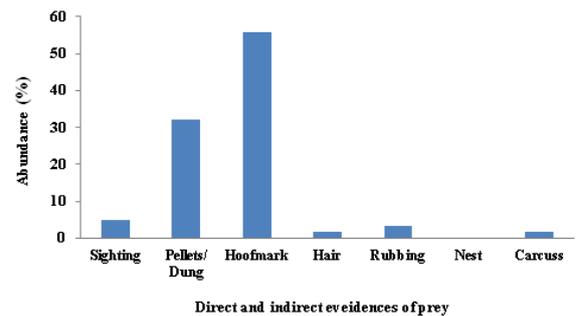


Fig. 3. Abundance of direct and indirect evidences of prey.

Though there was very less sighting of carnivore (5%), indirect evidences were common throughout the park. Hoofmark was the most common indirect evidence (56%) followed by pellet/dung (32%) and other (hair, rubbing sign and carcass) by 7% (Fig. 3).

Similar trend was also found while it was analyzed occurrence of species wise abundance of different indirect evidences (Fig. 4). Presence of hoofmark was the most common and pellet/dung was the second most common indirect sign.

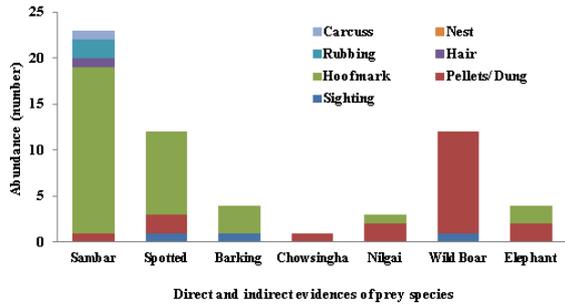


Fig. 4. Abundance of different prey species through direct and indirect evidences.

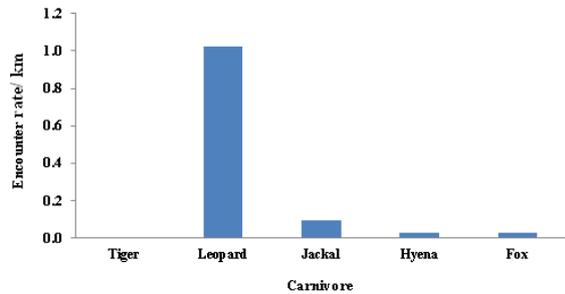


Fig. 5. Carnivore encounter rate (both direct and indirect sign) in Kalesar.

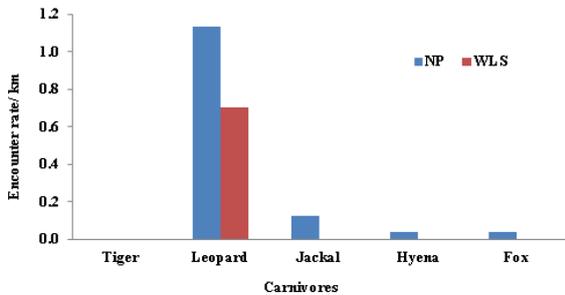


Fig. 6. Carnivore encounter rate in Kalesar NP and Kalesar WLS.

Encounter rate

A highest encounter rate (both direct sighting and indirect evidences) of 1.02 per km was recorded for leopard followed by 0.09/km for Jackal and 0.02/km both for hyena and fox (Fig. 5). This clearly indicates that leopard was the most common carnivore widely distributed in Kalesar. Among carnivores, leopard was also the most common in Kalesar NP (1.02/ km) and Kalesar WLS (0.71/ km). Interestingly, no evidence of

jackal, hyena and fox was found in Kalesar WLS (Fig. 6). This clearly indicates that leopard was common in both the protected areas.

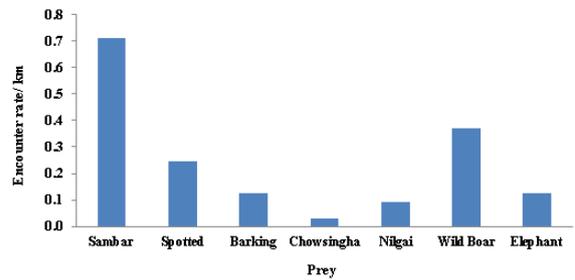


Fig. 7. Prey species encounter rate (both direct and indirect sign) in Kalesar.

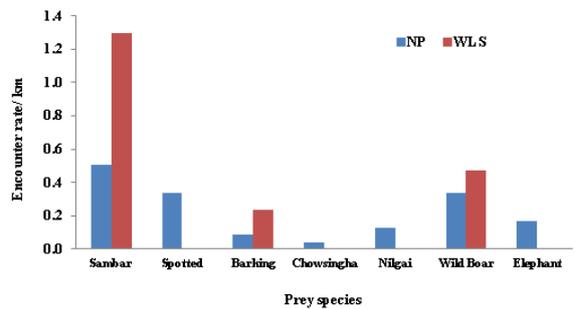


Fig. 8. Prey species encounter rate in Kalesar NP and Kalesar WLS.

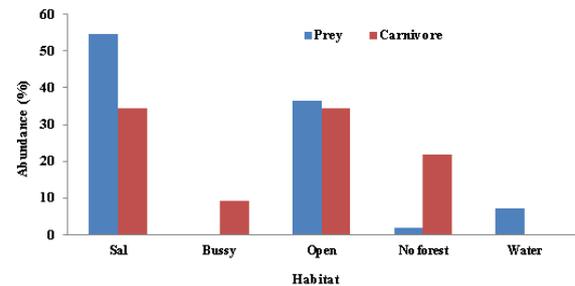


Fig. 9. Habitat selection by prey and carnivore species.

A highest encounter rate of 0.71 per km indirect evidence was recorded for sambar followed by 0.37/km for spotted deer and wild boar, 0.12/ km for barking deer and elephant, 0.09/ km for Nilgai and 0.03/ km for chowsingha (Fig. 7). This clearly indicates that sambar, wild boar and barking deer were the most common prey species widely distributed in Kalesar.

In Kalesar NP, sambar, spotted deer and wild boar were most common prey species. But in Kalesar WLS,

sambar, wild boar and barking deer were common prey species (Fig. 8).

Habitat selection

Both Sal dominated and open forest were found to be preferred habitat for prey species. Carnivores were also found in sal dominated and open forests during survey (Fig. 9). This clearly indicates that distribution of carnivores depend upon the distribution of prey species.

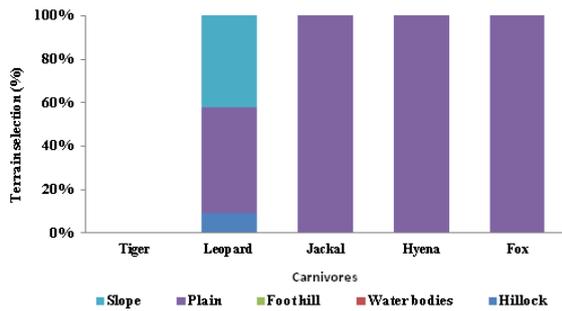


Fig. 10. Terrain preference of different carnivore species in Kalesar.

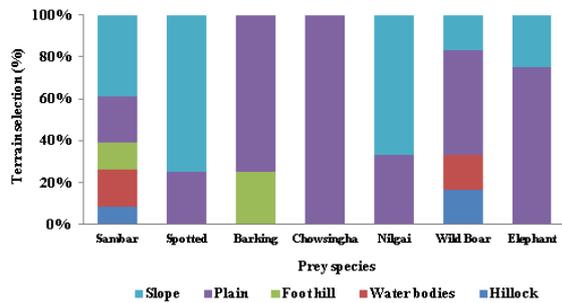


Fig. 11. Terrain preference of different prey species in Kalesar.

Terrain selection

Both plain and gentle slope were selected as the preferred habitat by leopard in Kalesar. However, jackal, hyena and fox preferred only the plain terrain (Fig. 10).

Interestingly among prey, gentle slope was preferred by sambar, spotted deer and nilgai while plain terrain was mostly selected by barking deer, chowsingha, wild boar and elephant (Fig-11). This clearly indicates that prey species mostly prefers both plain and gentle slope terrain.

Discussion

On the whole, the predator species richness is medium in both the reserve, but low in abundance, resulting in poor sighting of animals. Large carnivore prey selection is a complex phenomenon (Bekoff *et al.*, 1984; Sunquist and Sunquist, 1989). Tigers select larger prey than the wild dog and leopard. On the other hand, wild dog and leopard can survive even on small sized prey (Karanth and Sunquist, 1995). Prey selection also depends on prey availability and sometimes tigers show high selectivity towards less abundant species.

The four deer species that are commonly supported by most of the grasslands and scrubland forests are- Sambar, spotted deer, chowsingha and barking deer. Big cats being the predator prefer mostly deer as their food (Schaller, 1967; Sunquist, 1981). Most of the prey species was restricted to less disturbed hilly sal forest of the reserve. The range has mixed – moist plain forest preferred by deer species during the hot - dry season due to the fact that this forest type provides shade during the hottest hours of the day. Similar kind of observation was reported by Dinerstein (1987) in Royal Bardia National Park in Nepal where understory was dominated by woody vegetation and grasses were few. Barking deer was associated with high shrub density and grasses. He reported barking deer in secondary forest with high shrub density, mature sal forest and moist – mixed riverine forest in the Royal Bardia Reserve. Small rumen to body size ratio of the species along with higher nutritional requirements restricts this species to forested habitat where fruits, leaves and buds were more abundant. Such a diverse habitat preference of the species results into its uniform distribution in the entire reserve. The indirect sign used in abundance estimation of ungulate species in this study gives comparative and empirical status of prey species in the reserve. The study confirms that barking deer being a grazer species (Schaller, 1967) was also not abundant in the grasslands. Loss of grasslands due to natural succession in the reserve might have

adversely affected the abundance of the species leading to scarce sightings.

Wild boar was also less abundant throughout the park. The species prefers grassland and secondary forest to mature sal forest. Its association with nilgai states its close association with the grasslands in the reserve. Nilgai was very common in the outskirts of the forest despite of high disturbances along the forest fringe.

Local extinction might be the reason for the non-availability of tiger in this park. But the present study could provide some facts and figures on leopard distribution and relative abundance in the reserve. The study substantiated that leopard is more uniformly distributed throughout the park. In large prey scarce areas, where tiger abundance is poor or nil, leopard was more abundant and occupied more extent of the reserve. Since there is less prey base in the reserve, there is higher possibility to increase cattle lifting by leopard in the future. Therefore more focused study on distribution and ecology of leopards in the reserve is needed to check future human-leopard conflict in these reserves.

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