

Ecology of the dhole (*Cuon alpinus* Pallas) in Central India



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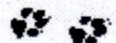
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EXECUTIVE SUMMARY

The Asiatic wild dog or dhole (*Cuon alpinus*) is one of the least studied social carnivores in the world. Even in many of the well-protected reserves, up-to-date scientific information on existing dhole populations remain negligible. It is most vital that a conservation strategy be evolved by collecting information on the biological and ecological requirements of dholes, and to identify the threats to the species at various levels. There is therefore an urgent need for in-depth, scientific research on dholes.

In order to gather such information on dholes, a four-year field research study on the dhole in Pench Tiger Reserve, Madhya Pradesh was initiated by the Wildlife Institute of India in May 2001. Pench Tiger Reserve in central India was chosen as the study site due to the relatively high and consistent presence of dholes, a large prey base, an existing logistic and research framework of the Wildlife Institute of India established at Pench, and relatively low biotic disturbances within this Reserve.

The objectives of the project in Pench Tiger Reserve, Madhya Pradesh, were to estimate the seasonal abundance of dhole prey species, the diet of the dhole packs from their scats and kills, to determine patterns of habitat use and range sizes of dhole packs, to estimate temporal changes in size and composition of dhole packs, and the processes behind such changes, to screen captured dhole and other animals for diseases, and estimate the probability of contact with potential disease carriers, to devise standardised protocols for dhole population surveys and to estimate dhole population size for the Tiger Reserve.

To collect information on the home range, habitat use, movement and activity patterns of dholes, three individuals from different packs were captured, immobilized, fitted with radio-collars and subsequently tracked for five to 12 months in this study. This study has the distinction of being the first long-term radio-telemetry study of dholes anywhere in their geographical range.





Systematic estimation of prey abundance was conducted on 19 permanently marked line transects and 10 un-marked GPS-based transects, averaging a length of 2.3 km each (1.2 - 3.5 km) for the dry seasons (Nov-June) from 2001 to 2003, using the Line Transect Method. Line transect sampling was carried out only within the approximate ranges of each radio-tagged pack, for the period November 2003 – June 2004. The transect lines covered an actual area of 85.2 km², which was ca. 29 % of the National Park area, and 11 % of the Tiger Reserve. Over the study period, the total annual length of transects in the study area averaged 41.2 km (27.3 – 51.0 km). Sighting angles and distances were recorded accurately using a compass and a laser rangefinder respectively. The computer Program DISTANCE Version 4.1 Release 2 was used for analyses of line transect data, choosing the appropriate models with the lowest Akaike information criterion values, to yield density estimates of the different dhole prey species. The common langur data used was only from those individuals of a troop that were sighted on ground, to reflect what was available as prey to dholes.

It was found that data on abundances of gaur and nilgai, from line transects, was not adequate. The number of sightings from line transects was high for chital (n=449) and langur (n=261), medium for sambar (n=142), adequate for wild pig (n=70). Chital, followed by langurs on ground, were most encountered dhole prey species from both line transects and road counts.

Data regarding the encounter rates (numbers of animals sighted per km travelled) and group composition (group sizes, age-sex structure, etc.) of dhole prey species were also recorded using vehicle-based road counts from a four-wheel drive vehicle. A total of 660 km was travelled for the period 2001-2004.

Chital by far were the most numerous of the prey species in Pench. This species dominates the landscape in Pench in terms of both sheer numbers and biomass. Sambar, though, being the third-most numerous prey species in Pench, contribute the most in biomass next to chital. Their density in Pench is relatively on the high side, and this fact corroborates the great potential of Pench for large carnivores, as sambar is a keystone prey species.





Populations of both the two major prey species, chital and sambar, were dominated numerically by adult females, showing a clear female-biased sex ratio. In the case of chital, adult females constitute nearly half their population, whereas in sambar adult female form more than half the population. The adult sex ratios in the two prey species were: 50 males to 100 females in chital; 22 males to 100 females in sambar. The female: fawn ratio was 1: 0.27 for chital, and 1: 0.3 for sambar. Mean group size of chital was 22.58 (± 2.2 SE), while that of sambar was 3.15(± 0.2 SE).

Biomass densities of the different prey species were computed by multiplying the estimated mean numerical densities by the published average weights of the respective age/sex-classes of the species. From the population structure of the prey species obtained from the *ad libitum* counts, the biomass was corrected for the actual population structure.

Dhole scats (n= 725) and kills (n=137) were recorded whenever encountered, for dietary analyses to yield information on the prey species consumed, their age and sex class, and further on, biomass consumed. Only one scat was collected per site/pack per day to ensure scat samples were independent. Kills made by dholes were located by actively searching the study area for the same, or on an *ad libitum* basis.

The diet of dholes was estimated using standardised faecal analysis to determine the relative frequency of occurrence of prey species remains in scats, and also by recording the frequency of kills of particular prey species to determining age and sex class of prey killed. From these, prey selection by the dhole was arrived at.

Since prey distribution and abundance varies seasonally, wet and dry season diets and prey selection were compared between these seasons and focused on frequency of occurrence. Prey encounter rates obtained from line transects and road counts were used as indices of prey encounter by dholes. Percentage frequencies of different prey species in dhole scats was calculated by enumerating the number of scats with remains of a particular species out of the total number of scats with prey remains, depicted in the form of a percentage figure. Frequency of occurrence of a prey species was



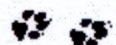


calculated as the number of occurrences of that prey species divided by the total number of scats analysed, also expressed as a percentage. Further, the relative numbers and biomass of different prey consumed by dholes and the relative biomass contribution of different prey species to the dhole diet was estimated.

Analysis of dhole scats and kills indicated that dholes consumed a minimum of seven prey types. Of the 725 dhole scats analysed, sambar remains were the most frequent prey item in dhole scats (nearly 50 %), followed by that of chital (38%). Significantly, 31 scats contained remains of langur. Around 6 % scats contained remain of more than one prey species. Analyses indicated that sambar was the only prey species preferred by dholes i.e. consumed more than their availability in the study area, while chital, langur and wild pigs were consumed less than their availability. Wet and dry season diets of dholes did not show any significant difference.

In total 137 dhole kills were assessed with respect to prey species, its age-sex class, and identity of dhole pack (if known). 53% of the dhole kills recorded were made in the morning, 27% in the evenings and 6.5% were kills around mid-day. Only one kill was recorded to have been made in the night. More than 80 % of the 137 dhole kills recorded for this period were that of chital, and around 13 % that of sambar. The age-sex class distribution of each major prey species in the kills data was compared with the corresponding population age-sex distribution recorded from road counts and *ad libitum* counts, to check if dholes were selecting for a particular age-sex class of their prey. There appears to be a significant sex-bias in dhole kills of chital, with more kills of adult stags compared to those of does. Adult chital stags and fawns were taken significantly more than their availability in the population, whereas adult chital does were taken significantly less than their availability. There was no significant selection for sub-adult chital by dholes. Among chital stags killed by dholes, 65% were in 'velvet', and 35 % in 'hard' antler.

In the case of sambar, the juvenile age class (sub-adults and fawns) accounted for more than three-quarter (78%) of sambar killed by dholes, of which fawns alone formed half the number of kills. Dholes showed selection





for age-sex classes of sambar too. Sub-adult sambar and fawns were taken significantly more than their availability in the population, whereas adult sambar does were taken significantly less than their availability. There was no significant selection for adult sambar stags by dholes.

The average weight of the major prey killed by dholes was 55.3 kg. Nearly 70% of the kills were that of the 26-100 kg size class, with the large (51-100 kg) prey size being the preferred weight class by dholes. There was no significant correlation between dhole pack size and the prey weight. Average meat available for consumption per dhole per kill amounted to 7.54 kg.

In all, sambar and chital constituted by far the main prey of dholes, with just these two species making up about 95 % of all kills and scats recorded in this study.

The radio-telemetry study revealed that home range sizes of radio-collared dholes in Pench covered 66.4 km² to 202.8 km² (95% MCP). Seasonal home range size averaged 77.58 (\pm 26.6 SE) km², while core areas of dhole packs averaged 57.5 (\pm 18.8 SE) km² (80% ADK). Activity centres of dholes averaged 32.2 km² (18–57 km²) (65% HMM). Dhole packs restricted themselves to a small area (15-20 km²) during the denning and nursing season (winter: Nov-Feb). Ranges increased (30-60 km²) gradually during post-denning (pup-rearing) season (spring-summer: Mar-June). A great increase in home range sizes (< 100 km²) occurred during the dispersal & pre-denning season (monsoon: July-Oct). Based on intensive tracking of an optimal pack of 14 dholes, it was concluded that 60-70 km² would constitute the ideal home range area required for a dhole pack, with a smaller activity centre of ca. 20 km². Thus, the dhole density in Pench would be 0.2-0.23 dholes/km² or 1.43-1.66 packs/100 km². Monthly range sizes of the radio-collared dholes ranged from a minimum of 1.5 km² to a maximum of 92.6 km². On an average, monthly ranges covered around 38 km².

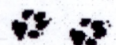
Mean daily distance (inter-day distance) moved by dholes in Pench spanned 2.96 km (\pm 0.16 SE) whereas mean travel speed of dholes packs





was 2.54 km h⁻¹ (\pm 0.36 SE), with a maximum travel speed of 16.1 km h⁻¹ in one session.

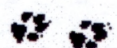
Based on the monthly range sizes and corresponding pack sizes of the three dhole packs, it was found that mean density of dholes in Pench was 0.29 (0.08 \pm SE) dholes km⁻², or 2.9 dholes per 10 km². This density ranged from a minimum of 0.02 to a maximum of 1.34 dholes km⁻². If one of the study packs, ♀44 + 13 dholes, with a home range of 60-70 km² were to be considered as the ideal dhole pack, then the density would be 0.2-0.23 dholes km⁻² or 1.43-1.66 packs per 100 km².





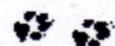
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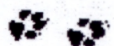
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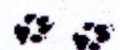




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