

## A Study of Occurrence of Red Fox (*Vulpes vulpes*) in Kargil District of Union Territory of Ladakh Using Occupancy Survey

<sup>1</sup>Javed Mohammad Iqbal and <sup>2</sup>Javaid Hassan Shiekh

<sup>1</sup>Department of Zoology, Government Degree College Kargil,  
Kargil, Ladakh - 194103 (India)  
mailzoology@gmail.com  
Department of Zoology, Sri Pratap College  
Srinagar, J&K - 190001 (India)

### Abstract

The District of Kargil in Ladakh is home to a variety of rare and endangered species of flora and fauna (Bhatnagar *et al.*, 2006). Despite its ecological significance, there is limited information on species occurrences within this region, particularly concerning the red fox (*Vulpes vulpes*) (Maheshwari & Sathyakumar, 2019). This study employs an occupancy survey to assess the distribution and presence of red foxes across Kargil, utilizing recent advances in survey methodologies and citizen science approaches. The findings aim to contribute to effective conservation planning in the region.

**Key words :** Red fox, *Vulpes vulpes*, Kargil Occupancy survey.

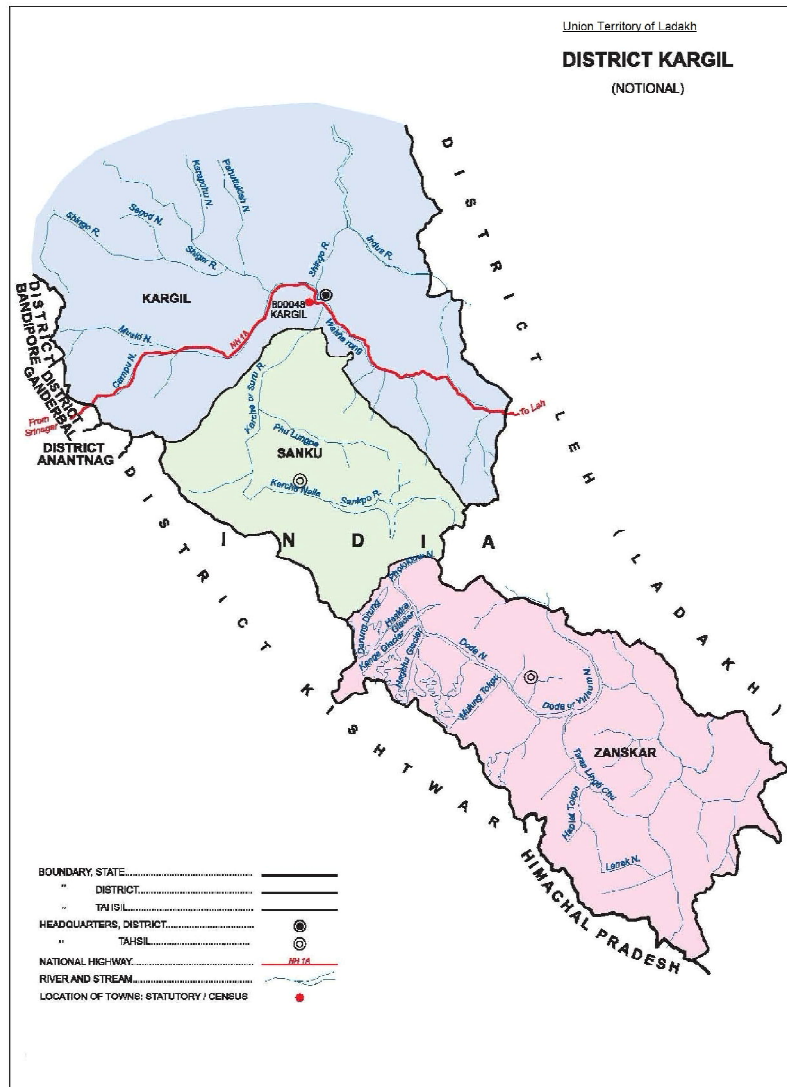
**K**argil District, encompassing an area of approximately 14,000 km<sup>2</sup>, is divided into four sub-divisions (Kargil, Zaskar, Sankoo, and Shakar-Chiktan) and seven tehsils (Drass, Kargil, Shargole, Shakar-Chiktan, Sankoo, Taisuru, and Zaskar)<sup>7</sup>. The region is drained by the Zaskar River (east of Pensi La) and the Suru and Dras Rivers (west of Pensi La), providing diverse habitats that support unique biodiversity<sup>1</sup>. Despite the presence of species such as snow leopards, brown bears, Ladakh urial, ibex, marmots, and raptors<sup>6,7</sup>, Kargil lacks

designated protected areas (PA)<sup>8</sup>. With the Project Snow Leopard initiated by the Ministry of Environment, Forest and Climate Change (MoEFCC) in 2009, India has shifted towards inclusive, landscape-based conservation, presenting an opportunity to strengthen conservation efforts in Kargil<sup>1</sup>.

Reliable information on species occurrence is essential for effective conservation planning<sup>7</sup>. However, data on species distribution in Kargil is sparse compared to the Leh

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<sup>1,2</sup>Senior Assistant Professors



Source: LAHDC Kargil (2024)

District, where years of research have yielded valuable insights<sup>6</sup> (Sathyakumar, 2019). This study aims to fill this gap by employing occupancy surveys and engaging citizen scientists to gather data on the red fox population in Kargil<sup>8</sup>.

A systematic, grid-based approach was applied to ensure representative coverage across Kargil. The district was divided into 10 km x 10 km grids to estimate the occurrence of red foxes. Field researchers and local experts from various villages were identified

and engaged in data collection. A simple questionnaire and species-identification manual were developed to assist in this process. Training workshops were organized to equip the research team with the skills needed to conduct interview-based occupancy surveys. Each team member collected information from at least five key informants in their respective villages, focusing on individuals over 30 years old with herding or dwelling experience. Informants were asked to recount red fox sightings and detections in areas they were familiar with.

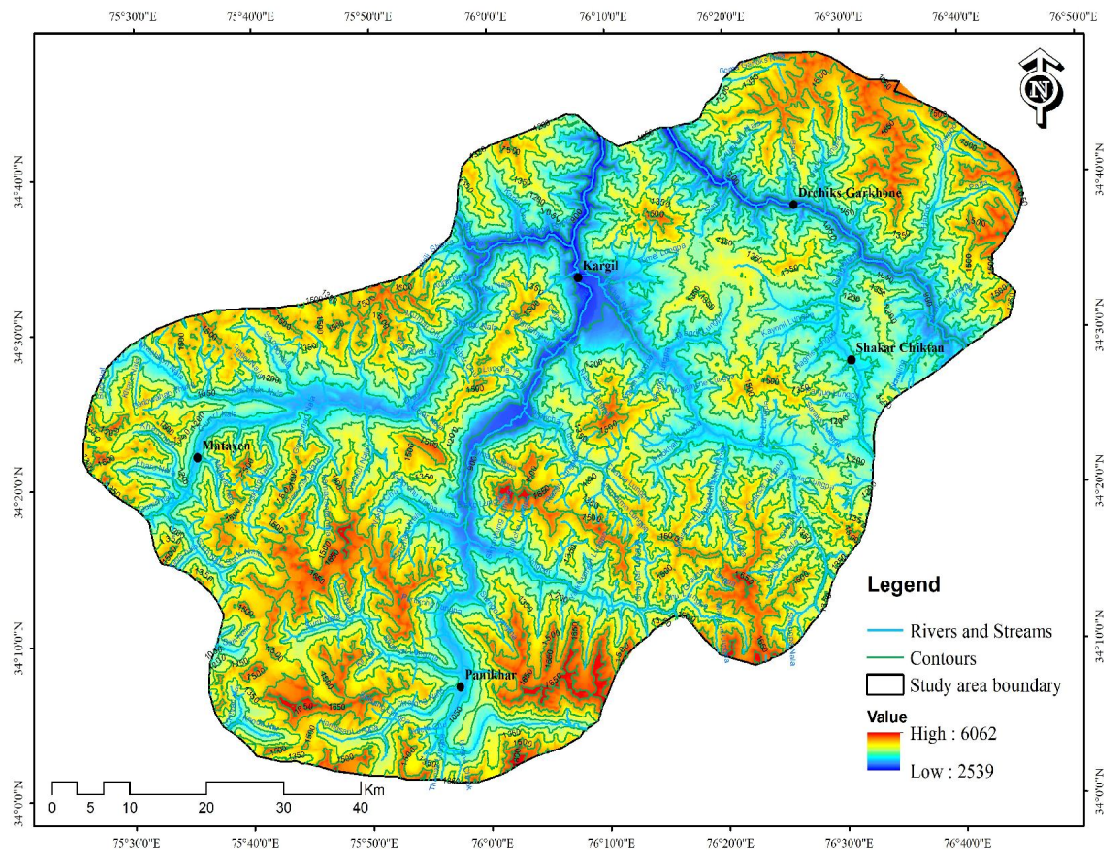
The study uses occupancy survey to assess the occurrence of Red Fox in Kargil district. Occupancy surveys are a valuable method in ecology for assessing the distribution and presence of species like the red fox (*Vulpes vulpes*) in challenging environments such as Kargil. These surveys rely on systematic data collection of species detection and non-detection across a grid of predefined sampling units, which helps researchers estimate species occupancy while accounting for imperfect detection<sup>5</sup>. By repeatedly surveying these grid cells, researchers can gather information about the probability of species presence and identify factors influencing habitat use<sup>4</sup>. In the context of the Ladakh region, where direct observations can be difficult due to the harsh terrain and elusive nature of species, occupancy surveys provide an efficient and robust framework for monitoring red fox populations<sup>6</sup>. Additionally, integrating citizen science into these surveys can enhance data quality and promote community involvement in wildlife conservation efforts, fostering a greater understanding and stewardship of local biodiversity<sup>3</sup>. The use of occupancy surveys in Ladakh not only helps

in understanding red fox distribution patterns but also aids in developing informed conservation strategies tailored to the unique ecological and cultural context of the region<sup>8</sup>.

The occupancy survey conducted across 100 villages in the Kargil district revealed that red foxes (*Vulpes vulpes*) were reported in 90 villages, indicating a high level of occupancy across the region. The data collected from key informants identified several hotspots of red fox occurrence, primarily located in areas with minimal human disturbance and abundant prey availability. Villages in Sankoo, Chicktan, Drass sub divisions reported the highest frequency of sightings, suggesting that these areas provide optimal habitat conditions for red foxes.

Statistical analysis of the survey data indicated a strong correlation between red fox presence and proximity to water sources, with 80% of sightings occurring within 1 km of rivers or streams. This finding underscores the importance of riparian habitats in sustaining red fox populations, likely due to increased prey abundance and availability of cover<sup>5</sup>. Furthermore, the analysis highlighted a significant association between red fox presence and low human activity, with foxes more frequently detected in regions characterized by sparse human settlements and limited agricultural activities.

These patterns suggest that red foxes in Kargil are adapting to specific ecological niches that offer reduced human interference and ample resources. The findings highlight the potential impact of anthropogenic factors on red fox distribution and emphasize the need



for conservation strategies that preserve critical habitats and mitigate human-wildlife conflicts<sup>8</sup>. The use of occupancy surveys, combined with local ecological knowledge, proved effective in identifying key areas for red fox conservation and provided a valuable framework for future monitoring efforts in the region<sup>4</sup>.

The findings of this study underscore the significance of integrating citizen science with systematic survey methods to gather data on species occurrences in remote and understudied regions. The engagement of local communities in data collection not only enriched the dataset but also fostered a sense

of stewardship and awareness of wildlife conservation among residents.

The use of a grid-based approach ensured comprehensive coverage of the Kargil District, allowing for a more accurate assessment of red fox distribution. However, challenges such as data accuracy and variability in informant knowledge were encountered, emphasizing the need for continuous training and refinement of data collection protocols.

This study demonstrates the utility of occupancy surveys and citizen science in bridging information gaps on species occurrence in the Kargil District. The observations provides

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a foundation for informed conservation planning and management of the red fox population in Ladakh. Further research is needed to expand this approach to other species and regions, contributing to the broader goal of biodiversity conservation in the Himalayas.

References :

1. Bhatnagar, Y. V., R. Wangchuk, and C. Mishra, (2006). *Oryx*, 40(2): 229-232.
2. Conrad, C. C., and K. G. Hilchey, (2011). *Environmental Monitoring and Assessment*, 176(1-4): 273-291.
3. Dickinson, J. L., B. Zuckerberg, and D.N. Bontar (2010). *Annual Review of Ecology, Evolution, and Systematics*, 41: 149-172.
4. Kéry, M., and J. A. Royle, (2015). Applied hierarchical modeling in ecology: Analysis of distribution, abundance and species richness in R and BUGS: Volume 1: Prelude and static models. Academic Press.
5. MacKenzie, D. I., J.D. Nichols, J.A. Royle, K. H. Pollock, L. L. Bailey, and J. E. Hines, (2017). *Occupancy estimation and modeling: Inferring patterns and dynamics of species occurrence*. Academic Press.
6. Maheshwari, A. and S. Sathyakumar (2019). *Journal of Threatened Taxa*, 11(4): 13341-13348.
7. Namgail, T., J. L. Fox, and Y. V. Bhatnagar, (2007). *Ecological Research*, 22(1): 25-31.
8. Suryawanshi, K. R., Y. V. Bhatnagar, and C. Mishra, (2013). *Oryx*, 47(2): 235-243.