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Research Article

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Mammalian Diversity and Movement Dynamics Using Automated Cameras

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ABSTRACT
Elk Island National Park (EINP), Canada's only fully fenced national park, EINP provides a secure habitat for species such as North American elk and bison, while also hosting moose, white-tailed deer, and over 250 bird species.

Keywords: Mammalian Diversity, Wildlife Movement, Elk Island National Park (EINP), environmental challenges

Introduction

Elk Island National Park (EINP), Canada's only fully fenced national park, EINP provides a secure habitat for species such as North American elk and bison, while also hosting moose, white-tailed deer, and over 250 bird species.

However, wildlife movement is crucial for accessing resources and breeding opportunities, and anthropogenic barriers like fencing can fragment habitats, limit species connectivity and increasing competition for resources [1,2,3]. The park's fencing system aims to reduce wildlife-vehicle collisions and manage invasive species, but it also complicates animal movement, especially for larger species.

Objectives

- Determine how species utilize fence gaps, focusing on how the gaps affect connectivity between EINP and the Bever Hills Biosphere.
- Analyze the relationship between fence opening size, body size, and animal movement.

Methods

Friends of Elk Island Society (FEIS) deployed fourteen motion-sensing cameras near fence breaches in various sectors of Elk Island Park (Figure 1). A week's worth of camera images with ten or more crossings was selected to ensure unbiased analysis between February and August 2024. The images were processed using WildTrax for tagging species, individual counts, and travel direction. Cameras with fewer than ten crossings were excluded from further analysis. I categorized individual body sizes into small (coyote, red fox, snowshoe hare, beaver), intermediate (white-tail deer, mule deer), and large (bison, elk, moose, black bear) groups. Linear regression was used to assess the impact of fence opening size on crossing percentage, while ANCOVA analyzed crossing differences among various body size categories. A paired t-test evaluated seasonal effects on species movement patterns across the fence.

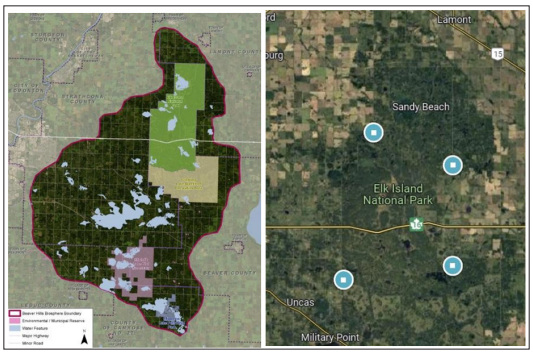

Figure 1: Map of Beaver Hills Biosphere (left), and map of Elk Island National Park (EINP) with site locations (right)

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Results

Across 11 camera sites, the mean fence gap measurement was found to be 3,574 cm², with 22,161 photos analyzed, of which 1,740 (7.70%) depicted animals and 379 showed animal crossings (Table 1, Figure 3).

Coyotes were the most frequent crossers (77.6%), followed by white-tailed deer (16.5%), with large ungulates like elk crossing only twice (Table 1). A logarithmic transformation was applied to the non- normally distributed fence gap measurements, revealing that gap size does not significantly predict animal crossings ($F = 3.94$, $p = 0.078$), accounting for 30.4% of the variation. The mean crossings varied across body sizes ($Chi^2 = 18.5$, $p = 0.0001$), with small individuals averaging 26.1 crossings, medium 6, and large 0.91. However, there was no interactive effect between size category and the fence gap area (Figure 2).

Table 1: Summary of Animals Observed to cross in different sites in Elk Island National Park, Alberta, Canada, in February-August 2024

Species	Crossed	Observed
Bison	0	529
Moose	0	79
Elk	2	334
Black bear	8	8
White-tailed deer	63	22
Mule deer	8	90
Coyote	295	470
Red fox	1	3
Beaver	1	2
Snowshoe hare	1	2
Red squirrel	0	1
	379	1740

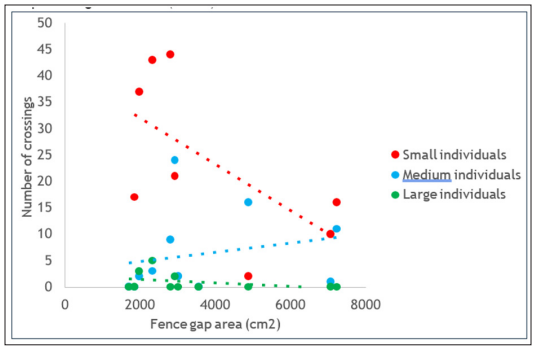

Figure 2: Linear slopes for the number of crossings per camera site for small and medium individuals ($F = 6.18$, $df = 5,32$, $p = 0.062$). Trend lines indicate a negative slope for small individuals (-0.0044), a positive slope for medium individuals (0.0006), and a positive slope for large individuals (-0.003)

Figure 3: Sample of camera pictures coyote, black bear, white-tail deer) denoting animal crossings in EINP

Conclusion

The study highlights the role of fence gaps in facilitating the movement of various animal species while maintaining the health of large ungulate populations, particularly in ecosystems like Elk Island National Park (EINP). Contrary to initial hypotheses, smaller fence gaps supported more crossings, suggesting that these gaps provide safety for smaller species but also facilitate the movement of general body sizes. Management recommendations include creating more human-built gaps to enhance landscape connectivity. Strategically, gapes should be placed near natural obstacles or features that already guide animal movement [4]. Management should consider incorporating additional human-built gaps along the fence line to enhance landscape permeability and improve ecological connectivity. Overall, the research underscores the importance of strategically designed fence gaps for promoting ecological connectivity and supporting wildlife movement in the face of environmental challenges.

References

1. Alberta Environment and Parks. Management plan for black bears in Alberta 2012.
2. Viana DS, Granados JE, Fandos P, Perez JM, Cano-Manuel FJ, et al. Linking seasonal home range size with habitat selection and movement in a mountain ungulate. Movement Ecology. 2018. 6
3. Youngmann JL, Hinton JW, Bakner NW, Chamberlain MJ, D'Angelo GJ. Recursive use of home ranges and seasonal shifts in foraging behaviour by a generalist carnivore. Ecology and Evolution Journal. 2022. 12.
4. Hering R, Hauptfliesch M, Kramer-Schadt S, Stiegler J, Blaum N. Effects of fences and fence gaps on the movement behaviour of three southern African antelope species. Frontiers in Conservation Science. 2022. 3.