RESEARCH BRIEF

Influence of landscape change and winter severity on invasive ungulate persistence in the Nearctic boreal forest

The research outlined in this brief is not affiliated with the ARCKP and the content below provides a high-level summary of some of the key findings and discussion points. For full details, please view the full research report.

Summary:

In recent decades, white-tailed deer populations have moved northwards in the boreal forest. Both climate change and landscape change contribute to these range shifts, resulting in a variety of ecological consequences. For example, increased deer populations facilitate increased wolf populations, changing the predator-prey dynamics for a variety of species. This is of particular concern to threatened woodland caribou populations because it exposes them to unsustainable levels of predation by wolves. In the context of protecting woodland caribou, understanding the relative Influence of climate and landscape change on white-tailed deer invasion is important to helping managers make decisions on where and how to concentrate their efforts to slow deer invasion. This study contributes to this understanding by examining how landscape change and variable winter severity impact the invasion of white-tailed deer in the boreal forest of Alberta.

Key findings and implications to management

White-tailed deer were identified in 112,648 images and were the most prevalent large mammal observed in this study. In each of the three study years, deer distribution decreased in more severe winters but rebounded each spring. Even in the most severe winters, where deer populations shrunk by as much as 50%, study sites with no deer detections were quickly recolonized the following spring. The researchers believe the early seral vegetation from surrounding disturbed areas provide sufficient winter refuge for deer until winter conditions subside enough for them to recolonize the unused sites. This conclusion was supported by the finding that deer persisted more in areas with upland forest and anthropogenic disturbance, where there is abundant deer forage. However, deer avoided landscapes with a high density of linear features, likely to avoid predation and recreational trail users. White-tailed deer were also observed to select areas the same throughout the year, suggesting that deciduous and early seral forage and avoidance of human-made linear features are consistent drivers of deer distribution in the boreal. Though provincial-scale studies suggest climate is the lead driver over landscape change in contributing to deer expansion, this study supports that both climate and landscape influence invasive deer species.

Methods

This study was conducted over three years with varying winter conditions. Winter severity was measured using mean daily snow depth. Deer occurrence was sampled via 62 camera traps across a range of disturbed and undisturbed landscape, classified into landcover categories. Temporal and spatial models were applied to estimate seasonal changes in deer distribution and their response to landscape change.

Limitations or remaining uncertainties

Though this study was fortunate to have winters with varying severity across its three study years, a longer analysis is needed to better understand deer response to climate change over time.

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Publication Year

2020

Research Theme

Understanding how climate and landscape change facilitate and sustain range shifts of white-tailed deer populations in northern boreal forests.

Study Area

A 3000 km^2 area of boreal forest in northeastern Alberta that is currently experiencing a northward expansion of white-tailed deer populations. There was extensive and diverse disturbance types throughout the study area.

Link to Full Article

Read the full article

Additional Resources

ARCKP webinar presentation (second presentation in the webinar recording)