

## Composite effects of forest harvests and seismic lines influence re-establishment of trees and shrubs in Alberta's mesic upland boreal forest

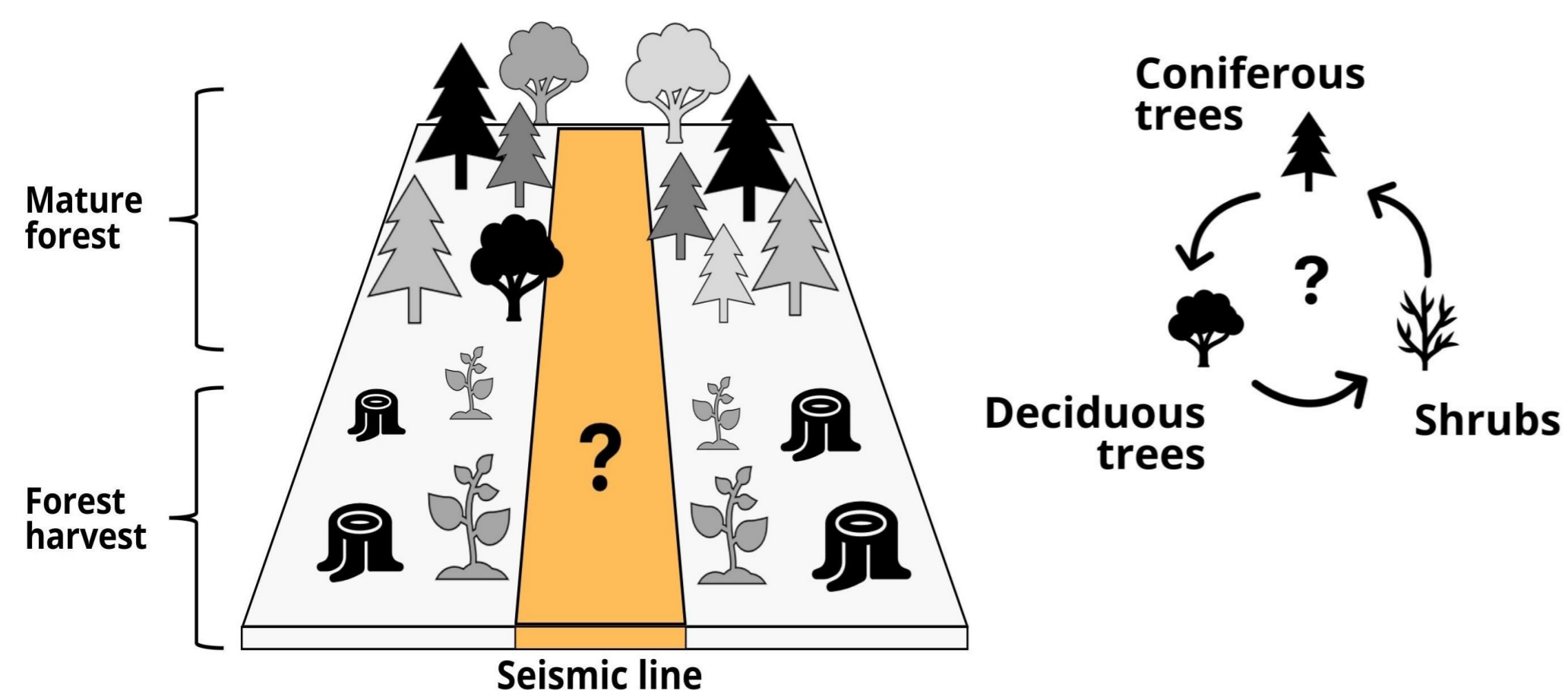
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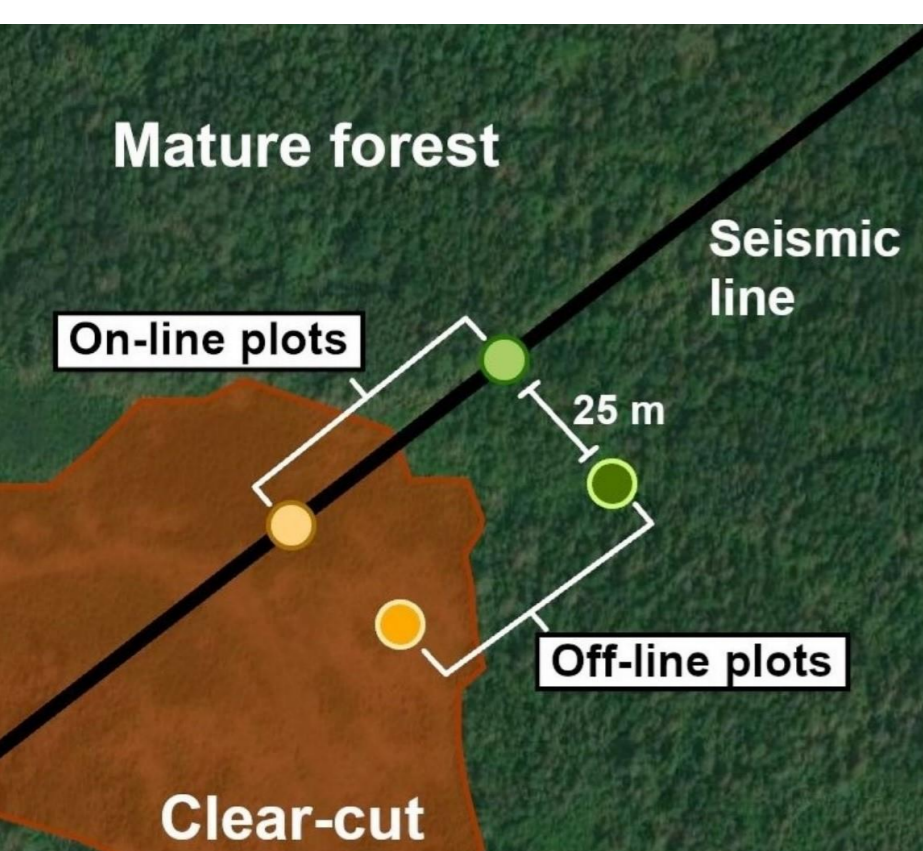
### INTRODUCTION & AIM

In Alberta's boreal forest linear corridors of cleared forest used for oil exploration called seismic lines, represent one of the largest contributions to landscape fragmentation with negative impacts on wildlife populations. Identifying favourable conditions for natural reforestation of these lines is a conservation priority.

Can forest harvesting “erase” seismic lines without affecting species composition?



### METHOD



60 plots sampled in Alberta's mesic upland boreal forest.

15 sites, each with 2 plots (on/off line) inside recently (1-10 yrs) harvested forests, and 2 plots (on/off line) in the adjacent mature forest.

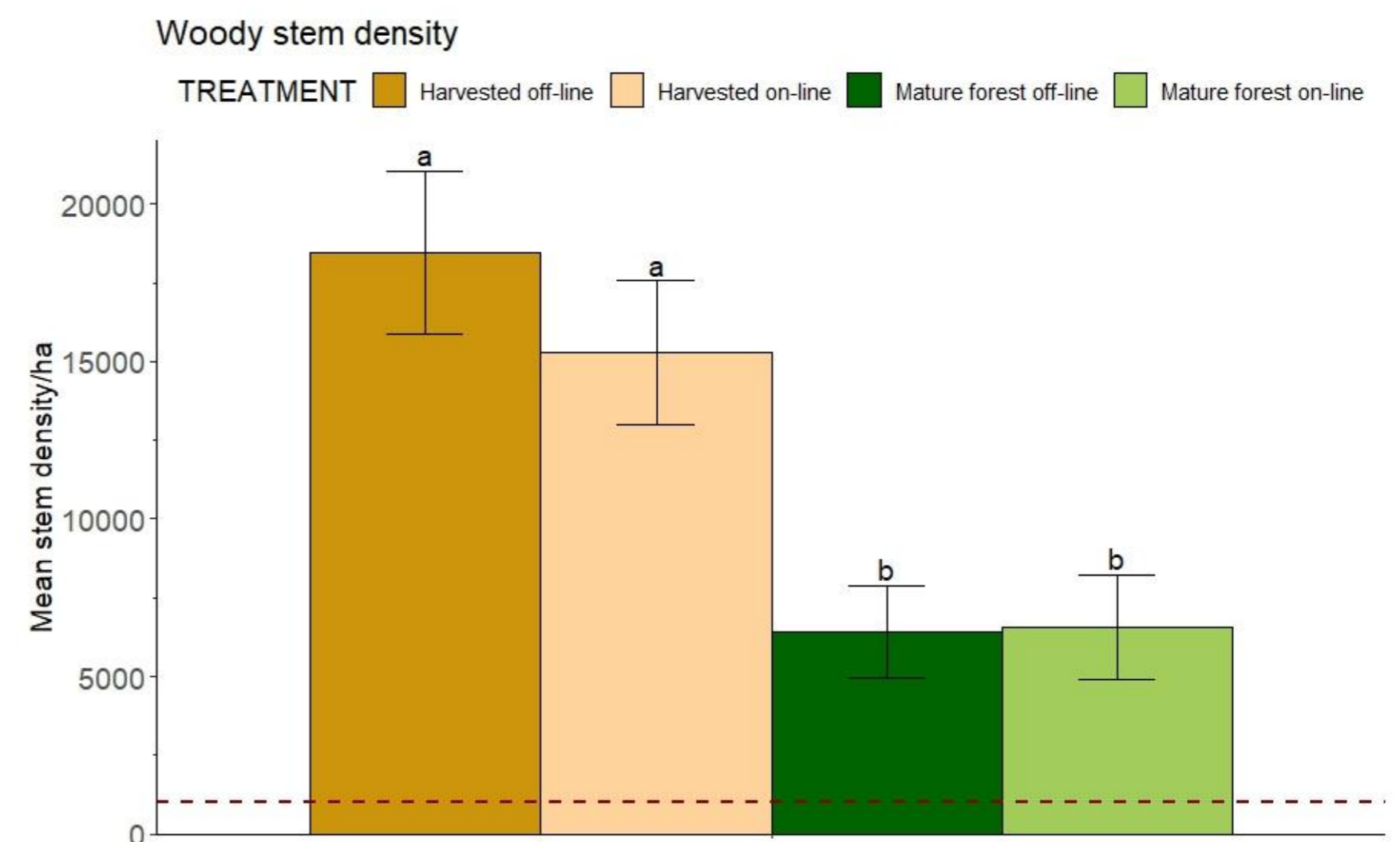
#### Regeneration survey

In each plot we counted all acceptable, non-germinant and live tree and shrub stems by species and height class.

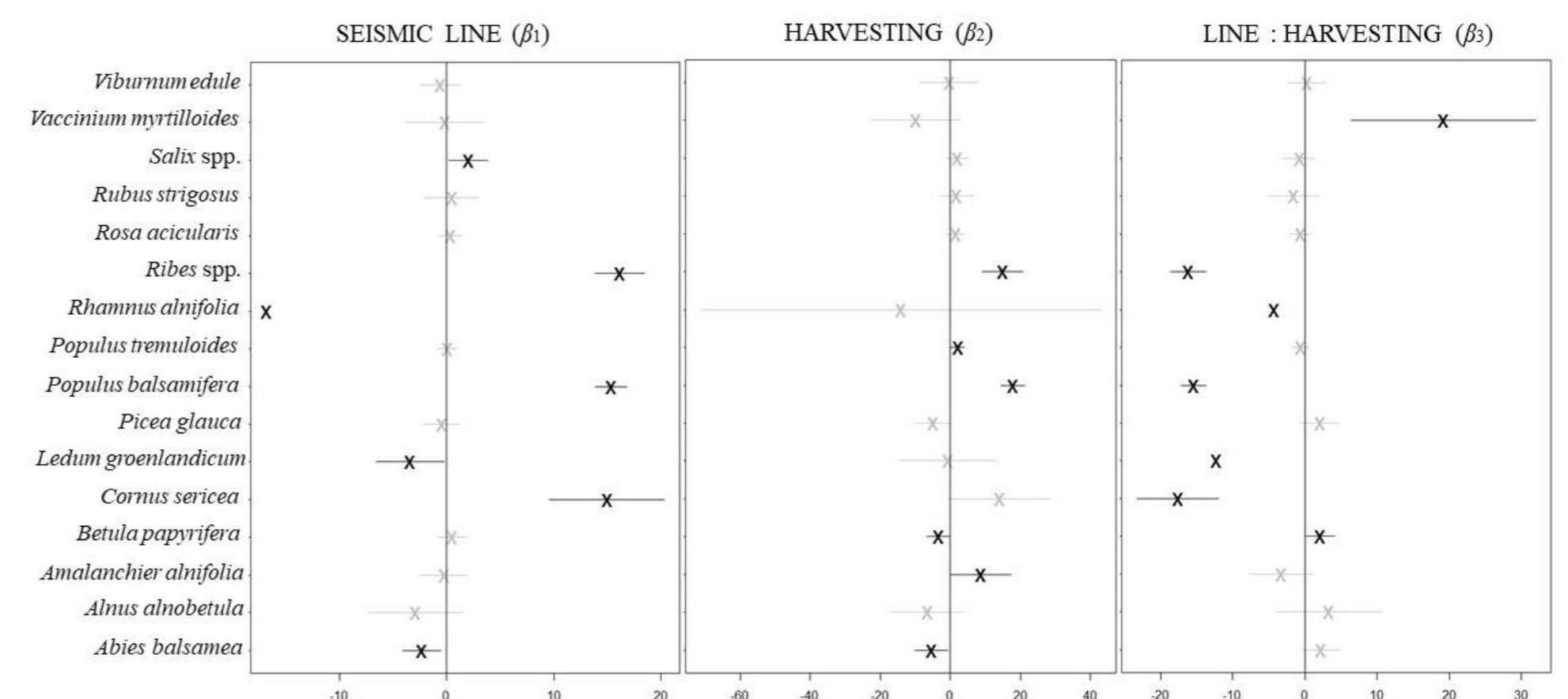
We assessed whether and how the co-occurrence with forest harvesting led to a structural regeneration of the line (counting 7 woody trees and shrubs species) and changes in the relative abundance of species assemblage (entire plant community).



### RESULTS & DISCUSSION



Means and standard errors of the total density per hectare by seismic lines or adjacent forest and presence/absence of harvests. Treatments with the same letter are not significantly different based on negative binomial regression ( $\alpha = 0.05$ ).



Estimated model coefficients (ticks) and 95% confidence intervals (lines) of marginal effects of seismic lines ( $\beta_1$ ), harvesting ( $\beta_2$ ), and their interaction ( $\beta_3$ ), on the mean abundance of each species considering the intrinsic correlation between species. Ticks and lines colored in black denote a significant effect on species abundance.

We found that harvested seismic lines exhibited ~130% more woody stems compared to untreated lines adjacent to mature forests, indicating that forest harvesting contributed to the structural recovery of the forest within the line. However, the co-occurrence of both disturbances resulted in an increase in deciduous stem abundance while decreasing shrub species abundance. Furthermore, we observed a significant interactive effect of the two disturbances on the relative abundance of around 40% of the species assemblage.

### CONCLUSION

The spatial overlap of seismic lines and forest harvesting facilitate restoration of forest structure, but also produces a distinct signature on species composition. While forest harvesting effectively “erase” seismic lines, emerging composite effects can significantly influence forest composition, with potential long-term implications for regeneration.

### FUTURE WORK / REFERENCES

Dabros, A., Pyper, M., & Castilla, G. (2018). Seismic lines in the boreal and arctic ecosystems of North America: environmental impacts, challenges, and opportunities. *Environmental Reviews*, 26(2), 214-229.

Picchio, R., Mederski, P. S., & Tavankar, F. (2020). How and how much, do harvesting activities affect forest soil, regeneration and stands?. *Current Forestry Reports*, 6(2), 115-128.