Sensitivity of Red Spruce (*Picea rubens* Sarg.) to Projected Warming in Eastern Canada from Tree-ring Analyses of Provenances Trials

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Red spruce (*Picea rubens*) is one of the most valuable tree species of Atlantic Canada and has been subject to severe declines in abundance and growth in the last century. As a result, the ecological and economic concerns about red spruce's response to climate change increases every day.

This study will match annual growth ring widths with corresponding historical climate conditions of 16 range-wide populations of red spruce distributed among twelve 60-year-old provenance trials in northeastern North America and covering a 5°C gradient. The study aims to assess the vulnerability of *Picea rubens* to projected warming by analyzing the annual growth and health of mature red spruce trees and correlate it with climatic variables. It also aims to model its sensitivity to the current climate, and possibly predict a potential change in growth to temperature increase. We will test the hypothesis that interannual growth variations are driven by warmer winters and warmer summers, with lower relative growth under cold summer temperatures; Correlation with precipitation increases in warmer sites, indicating some level of water limitation; and that red spruce population display a trade-off between cold hardiness and growth response to warming, with cold-adapted populations showing lower growth in warmer sites.
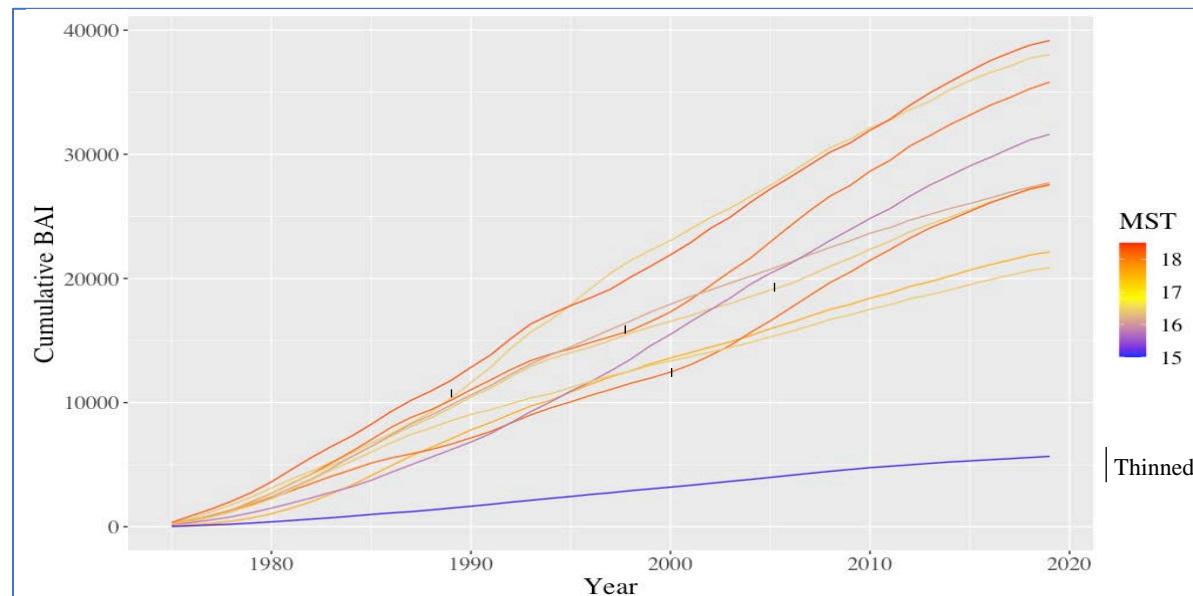

Figure 1. Cumulative basal area increment (BAI) of all trials sorted by mean summer temperature (MST)

Overall, summer variables seems to have a high influence in the red spruce interannual performance. The warmest site in terms of summer had the best growth performance, while the coldest had the lowest basal area. It's important to note that thinning and competition also have a major influence. Data analysis is scheduled to take place from March to June, and correlation and modelling are being carried out.