



AGGP-Agroforestry

## No. SASK-26

# HISTORICAL AND FUTURE GROWTH OF WHITE SPRUCE SHELTERBELTS IN SASKATCHEWAN

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We wanted to better understand how shelterbelt trees will grow in the future based on how they have already grown on the landscapes in the past. To do so, we sampled 125 shelterbelt locations across Saskatchewan covering the six dominant shelterbelt tree species, and covering a spatial network across all of southern Saskatchewan.

### ALL TREE SPECIES

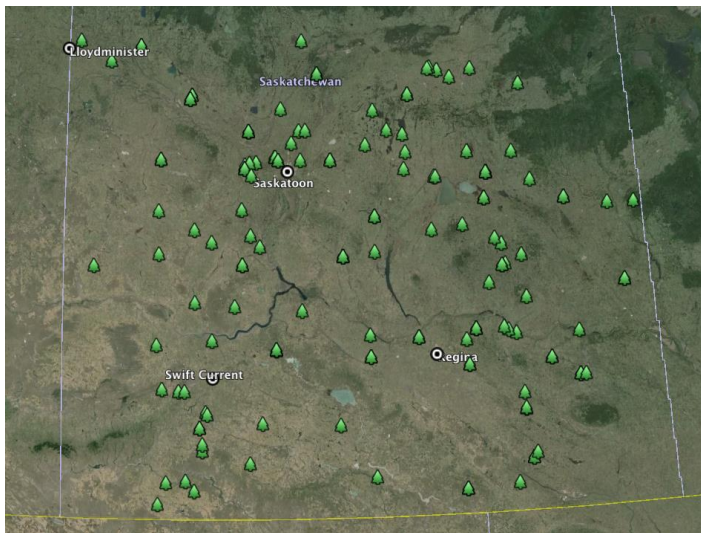


Figure 1: Locations where all six different tree species were sampled in southern Saskatchewan.

### THE WHITE SPRUCE SPECIES

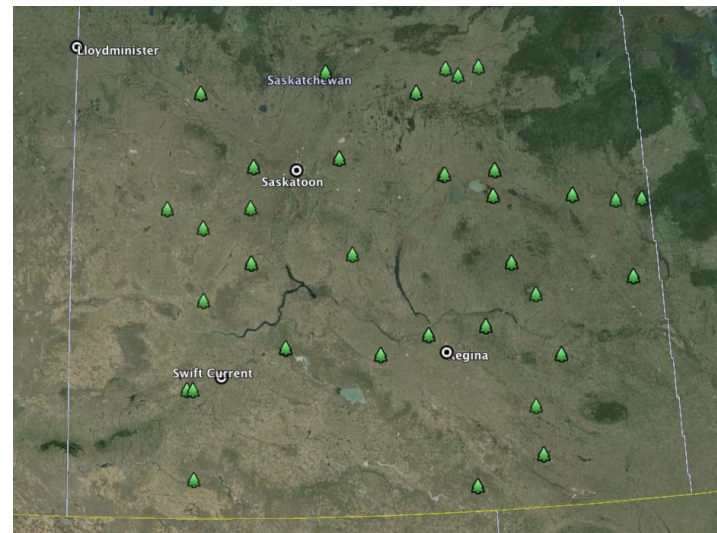


Figure 2: Locations where all of the white spruce species were sampled in southern Saskatchewan.

### CLIMATOLOGICAL LIMITING FACTORS

The most common climatological limiting factors that drive the radial growth of white spruce trees in order of importance across the southern part of the province are:

- Current year June Precipitation;
- Past year September and October precipitation and;
- Current year march and April precipitation.

From these data we get a better understand that white spruce is dominated by moisture signals. When it gets good moisture at key times in its growth cycle, it can do well. Most important is for it to get good moisture inputs when its rings are actively being formed in June. Next, it needs moisture to prepare sugars in the fall to initiate good growth the following year when coming out of dormancy. Lastly, if is gets good moisture inputs in the spring months, it will have a good overall growth year. Conversely, if does not receive good moisture inputs during one or all three of these key times, it will produce a small or very small growth ring in that given year.



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## AN EXAMPLE OF WHITE SPRUCE MODELLED FUTURE GROWTH

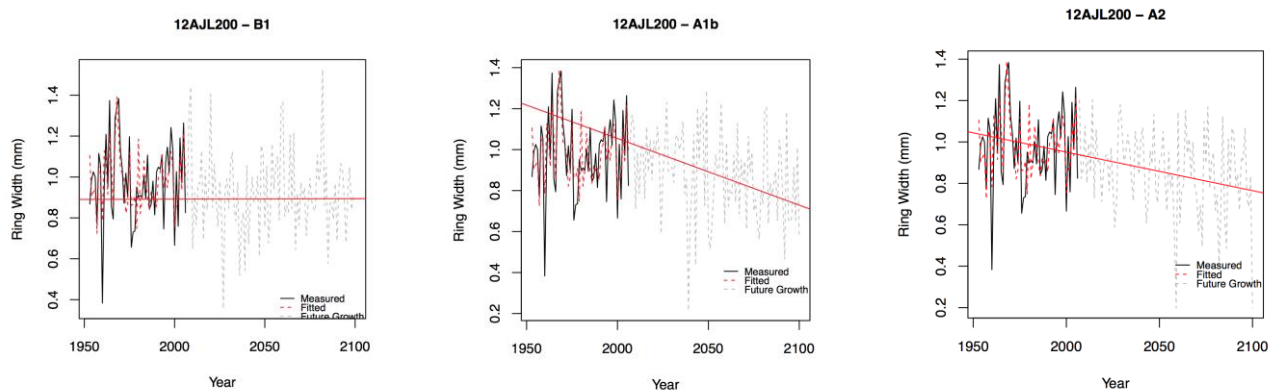


Figure 3a-c: An example of past (black lines) and modelled future growth (dashed lines) from a white spruce site near Canora Saskatchewan. The three future scenarios illustrate low (B1), medium (A1B) and high (A2) simulated CO<sub>2</sub> emission scenarios. The red line indicates the overall long-term trajectory of radial growth for white spruce.

### TRAJECTORIES ACROSS PROVINCE

Of the 30 locations modelled, most of the more extreme scenarios had a downward trajectory into the future, especially in areas of southernmost Saskatchewan that are projected to be hotter and drier in the future. As one moves northward in the province, the radial growth in general increases at these locations, as these areas are projected to have less moisture deficits in the spring which is a key to white spruce radial growth.

### INDIVIDUAL MODELLING LOCATIONS

For more specific information on future forecasted growth for each species in specific locations in Saskatchewan, please visit our radial growth model at:

[http://madlabsk.ca/model2/externaldata\\_3.html](http://madlabsk.ca/model2/externaldata_3.html)

### OTHER FACTSHEETS IN THE SERIES

Specific analysis on most of the locations in the study can be found on our web site at

<http://www.madlabsk.ca/> and <http://www.madlabsk.ca/reports.html>

**CONTACT FOR MORE INFORMATION: [SASKAGROFORESTRY.CA/](http://SASKAGROFORESTRY.CA/)**

### ACKNOWLEDGEMENTS & COPYRIGHT

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