AGGP-Agroforestry

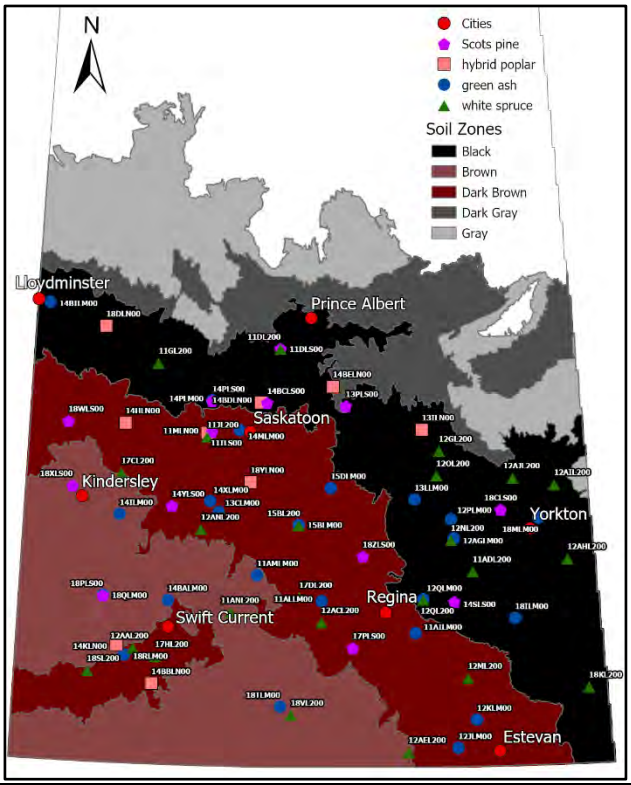
PREDICTING THE FUTURE GROWTH OF SCOTS PINE ACROSS SOUTHERN SASKATCHEWAN

No. SASK-50

by BROOKE HOWAT

We wanted to predict how shelterbelt trees will grow in the future under different climate scenarios. To do so, we sampled tree cores from four different shelterbelt species across 68 sites in the Brown, Dark Brown, and Black soil zones of Saskatchewan (Figure 1). The four shelterbelt species we sampled in this study were green ash, hybrid poplar, white spruce, and Scots pine.

All Tree Species



Scots Pine Species

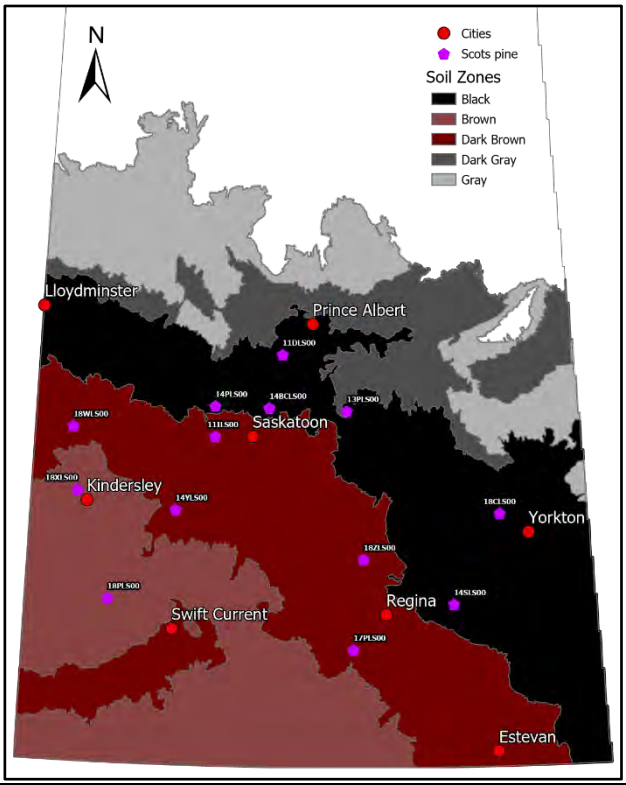


Figure 1. Locations where all four tree species were sampled, and the locations where all the Scots pine species were sampled across southern Saskatchewan.

Predicted the Future Growth of Scots Pine

Scots pine's main drivers of growth are spring and summer (mainly June) precipitation. The increase in Scots pine growth in the north and west is primarily attributed to the positive impact of increasing spring temperatures on Scots pine growth (Figure 2). Previous studies have found that past Scots pine growth is positively influenced by spring temperature, but this relationship is breaking down under warming climates. In the northwest corner of the study area, the relationship between spring temperature and Scots pine radial growth is positively correlated. This is likely because the northwest portion of the study area is relatively cold and has more snow/soil moisture; thus, warm spring temperatures melt the snow and help give the Scots pine a head start. Whereas in more southern areas of Saskatchewan, there is less snow/soil moisture, and warmer spring temperatures can further decrease soil moisture and "wake up" the trees too early, making them more vulnerable to early frost damage.

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The relationship between Scots pine growth and climate appears to be somewhat variable throughout the southern half of Saskatchewan. It would be helpful to have more sites to describe this relationship and see more of a pattern between predicted future climate and Scots pine radial growth. Figure 3 shows that Scots pine radial growth may increase northwest of Saskatoon (blue area), but otherwise, its growth is expected to decrease across the rest of southern Saskatchewan (brown).

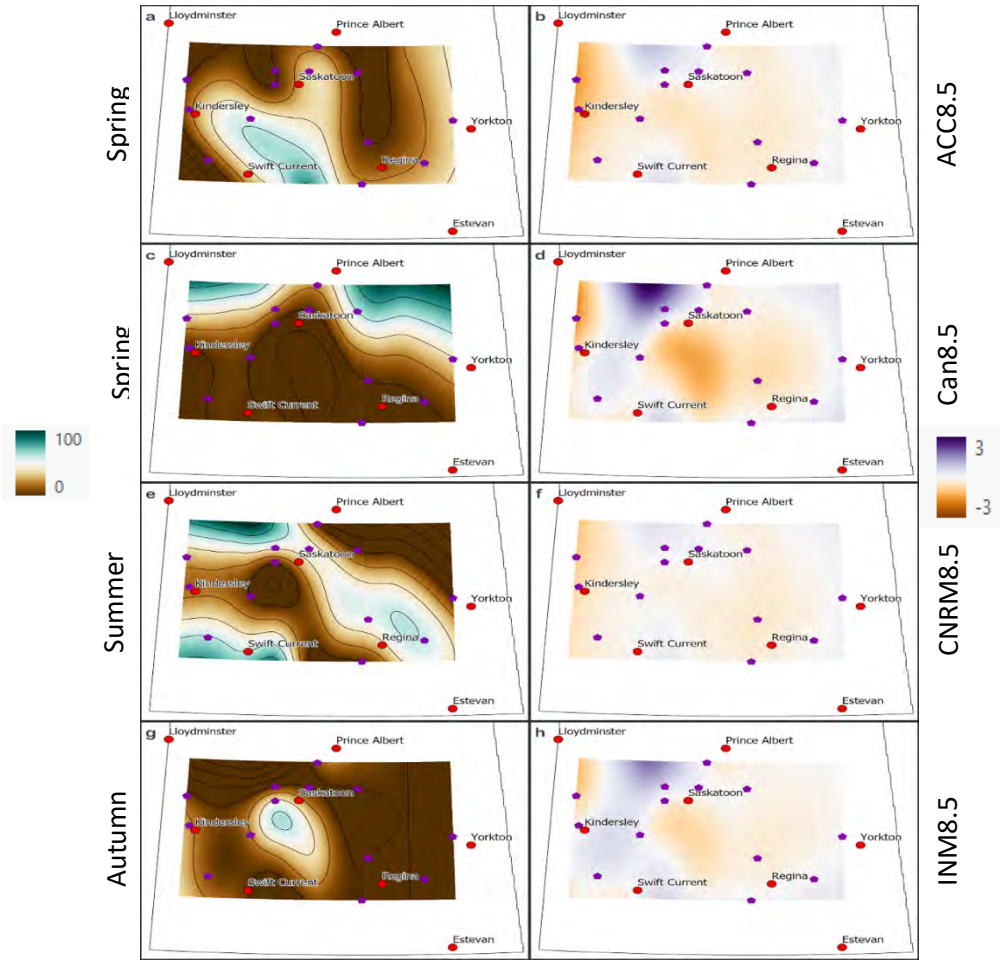

Figure 2. Spring precipitation and temperature and summer and autumn precipitation relative weights maps identify areas where these precipitation and temperature variables have the highest influence in the southern half of Saskatchewan (maps a, c, e, g). The maps on the right (maps b, d, f, h) predict changes in Scots pine growth for four climate models under a high emissions scenario (RCP 8.5) in the year 2100.

Further Reading

https://harvest.usask.ca/handle/10388/13164

Contact for more information: SASKAGROFORESTRY.CA/

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