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Abstract

As a part of the Agricultural Greenhouse Gases Program, which seeks to determine the carbon sequestration capabilities of shelterbelt trees and their response to climate and climate change, the Mistik Askiwin Dendrochronology Lab conducted a tree-ring analysis on shelterbelt trees throughout Saskatchewan. Using dendrochronological cross-dating techniques, a green ash growth chronology was built based on radial growth measurements from trees growing at the Berscheid site. At this site, green ash samples were collected from 20 trees, and the oldest samples were determined to be 37-years old with an average age of 30. It was also found that the green ash growing at this site is growing similarly to other green ash in the northeast.

Introduction

The Mistik Askiwin Dendrochronology Lab (MAD Lab), located at the University of Saskatchewan, is currently involved in a project for the Agricultural Greenhouse Gases Program (AGGP), which is investigating the capability of shelterbelt trees to store carbon. The carbon storage capability of these trees will inform their ability to off-set carbon emissions and potentially act as carbon credits. The objective of the larger project is to determine the current and future capacity of carbon sequestration in these shelterbelt trees.

In the summer of 2013, samples for this project were collected across most of Saskatchewan. These samples were used as a part of the larger study, looking at shelterbelt tree growth over time since the trees were planted. As a landowner, and therefore a stakeholder in this project, we would like to provide you with the results from our findings on your property.

Site Information

MAD Lab Site Code: 13HLM00

Date: June 1, 2013

Site Name: Berscheid Farm

Site Contact Info: Estella and Glen
Berscheid

Latitude: 52° 20' 30.0"

Longitude: -104° 58' 56.8"

UTM: 0501194 5799039

UTM Zone: 13U

MASL (m above sea level): 583m

Satellites: 9

Precision: ± 5m

Species Common Name: Green Ash

MAD Lab Species Code: M00

Methods

The MAD Lab sampled 20 green ash trees, using a 5.1 mm increment borer to take two core samples from each tree at approximately breast height. These samples were stored in plastic straws and taken back to the MAD Lab in Saskatoon, Saskatchewan for analysis. The samples were glued into slotted mounting boards and labeled with the appropriate site code. The samples were sanded with progressively finer sandpaper (60 to 600 grit) and then buffed in order to reveal the cell structure of the tree rings. The annual-growth rings were measured under a microscope using a Velmex stage system with a precision of 0.001 mm. The measurements from each core created a growth pattern, which could then be matched against the other cores from that site, in order to create a master chronology, which would demonstrate the overall tree growth patterns through time. The master chronologies were then standardized to remove age

related and biological growth trends, providing a cleaner signal. The resulting standardized growth chronology was compared to other green ash sites in the northeast to see whether green ash growth is synchronous over time. Pearson product moment correlation was used to evaluate the relationship between tree growth at green ash sites in the northeast.

Results and Discussion

The oldest samples were determined to be 37-years old at breast height, while the average age of all trees at the site was 30. This suggests they were planted in the mid-70's, which is in agreement with the database provided from the Prairie Farm Rehabilitation Association, which indicates that the green ash were sent there in 1974. The average raw ring-width measurement was determined to be 1.96 mm (see Figure 1 for the standardized growth of the tree over time). In this case, there was only one other green ash site that was sampled in the northeast, yielding a single value for correlation. The Pearson correlation coefficient was 0.429, which is significant to the 99.9% confidence interval, indicating that the green ash growth at the two sites is closely related (Figure 2 and 3).

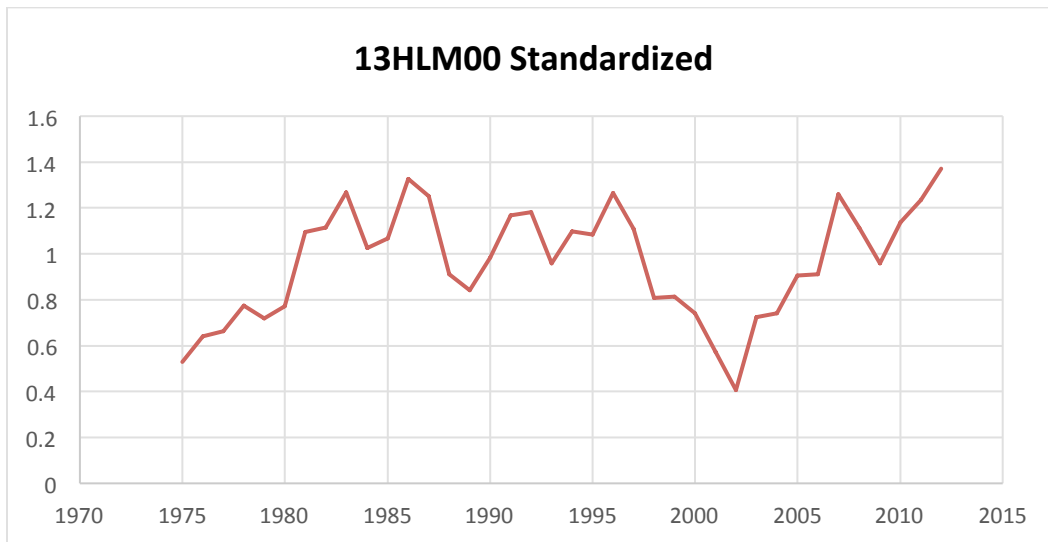


Figure 1: Master chronology for green ash at the Berscheid property. Standardized measurements of 1.00 indicate an average year of growth (in this case, associated with a raw ring-width of 1.96 mm), while any value above or below 1.00 indicate a year of growth that deviates from the average.

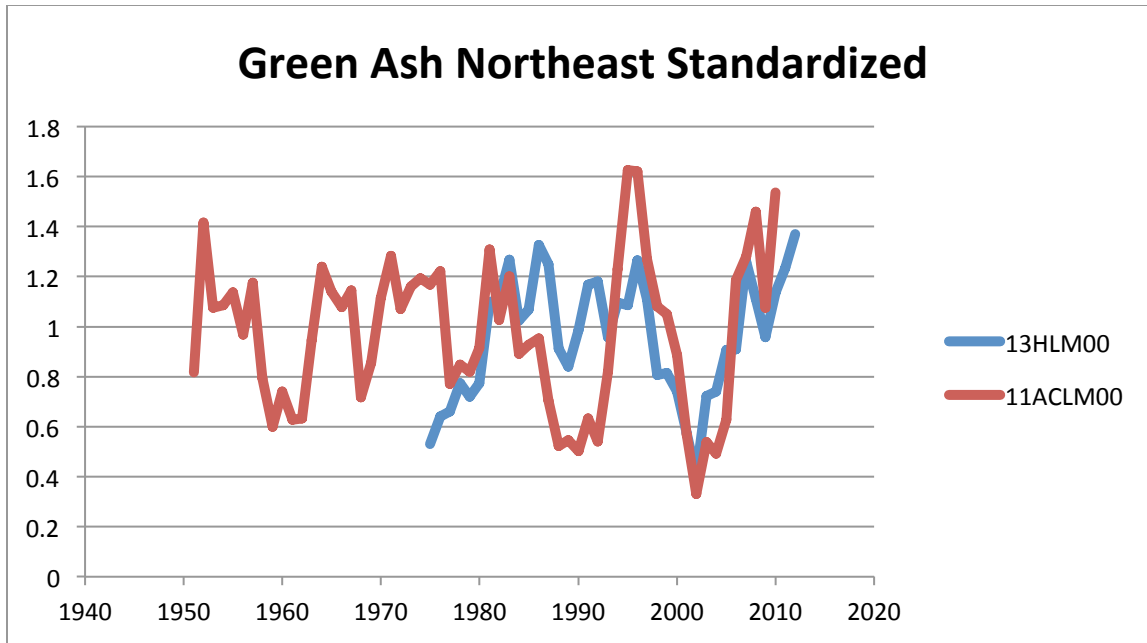


Figure 2: Comparing green ash standardized growth from the Berscheid site to growth at another site within the northeast of Saskatchewan.

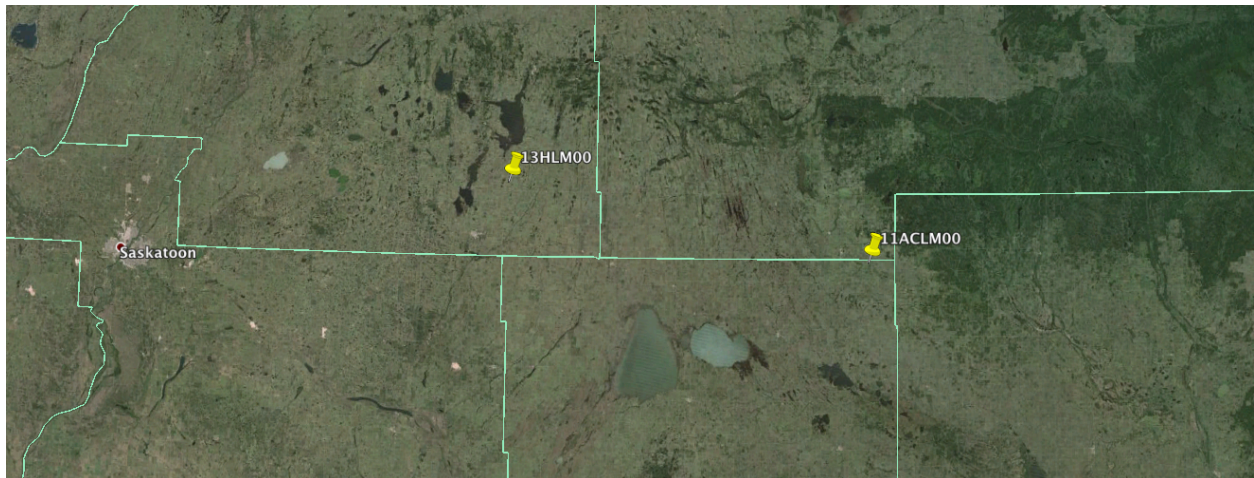


Figure 3: Location of the two green ash sites in relation to Saskatoon.

Conclusion

The results from this analysis help to strengthen our record of green ash growth over time within Saskatchewan's northeast. It can also be said with a certain level of confidence that green ash at the Berscheid site is growing similarly to other green ash within the northeast of the province. The data used from this site will be used in future studies, which will attempt to determine future growth trends and the amount of carbon sequestered by green ash to determine its potential and viability in carbon sequestration.

This research was conducted at the MAD Lab in Saskatoon, Saskatchewan, and funded through the AGGP. Any questions regarding the findings of this report should be directed to:

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