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AUGUSTANA NEIGHBOURHOOD URBAN FOREST REPORT

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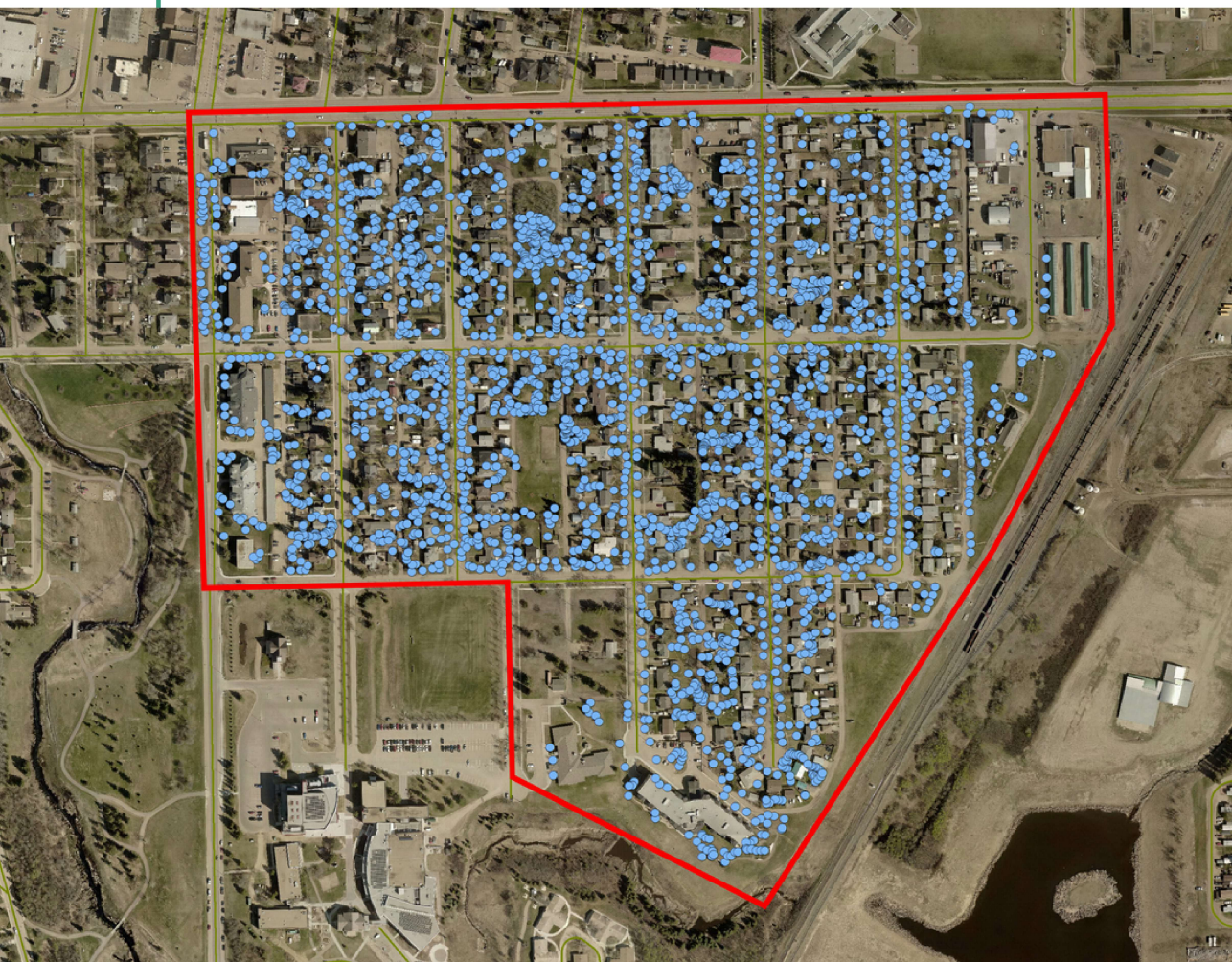


Introduction

During the summer of 2019, members of the Augustana Tree-Ring Lab conducted field sampling throughout the Augustana Neighbourhood (here defined as the area bounded by 50th St. on the west, 48th Ave. on the north, the CN railway tracks on the east, and Augustana Campus to the south). Our team measured more than 2,700 trees across both public and private land!

The goal of this project is to better understand the characteristic urban forest of the neighbourhood and showcase the benefits provided by those trees.

TOTAL TREE INVENTORY



WHAT IS AN URBAN FOREST?

The urban forest encompasses all trees within city limits, whether publicly or privately owned.

Urban forests are largely human-designed and form a larger ecosystem (1). They also include shrubs and other plants.

The urban forest provides important habitat for wildlife and performs ecosystem services like filtering the air or cycling nutrients. People and culture are also an important part of the urban forest! We shape the forest by integrating it with the built environment of our homes, businesses, and other infrastructure, and our practices influence the forest's health (2).



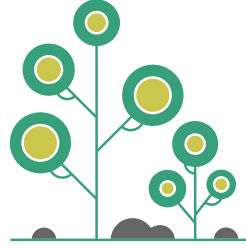
WHAT IS URBAN FORESTRY ALL ABOUT?

Urban forestry is a key part of urban planning and climate change adaptation plans (2), with urban trees and vegetation increasingly seen as green infrastructure for their important role in services like stormwater management, recreation, noise reduction, and temperature regulation. They can also be a source of fruit and other foraged foods (3).

Only 20% of municipalities have an urban forest management plan and while the numbers of street and park trees are generally increasing, the amount of natural cover is decreasing (4). Along with a lack of planning, urban forests face other large challenges from poor soil quality and a lack of dedicated funding (4).

Urbanization contributes to people becoming more isolated from nature and urban green spaces may be their main avenue for interacting with nature (1). Although trees are often overlooked day-to-day, there is a palpable sense of community loss when large numbers of trees are removed. This speaks to the important role they play in our lives.

BENEFITS OF URBAN TREES



This report highlights a few of the quantifiable benefits of trees in the city, but there are many other benefits that should not be overlooked. It is hard to put an economic value on the beauty of old elms reaching across a street or the sense of peace that we feel when surrounded by these trees, but that does not make them any less valuable in our consideration of how urban trees contribute to a community's quality of life.



Health and Wellness: The connections between time spent in nature and improvements to mental health through stress reduction, relaxation, and attention restoration are well documented (5–7). Physical health outcomes are also improved by proximity to greenspaces. Patients who can view a tree from their windows have been shown to recover from surgery faster and more easily (8).

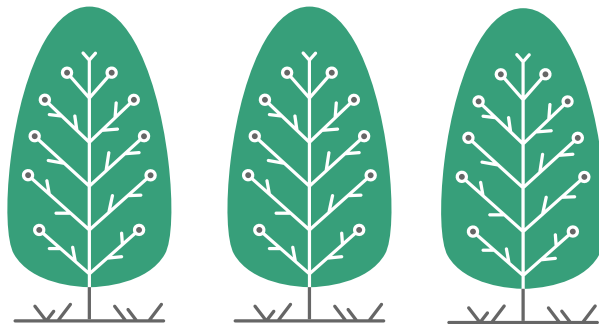
Social: Views of greenspaces are linked with benefits like better worker productivity, reduced domestic violence, and greater sense of well-being and neighbourhood satisfaction (7). For children, playing in green spaces has also been linked with improved development and cognitive abilities, reduced symptoms of ADHD, and better performance in school (7).

Aesthetics: Trees are often seen as representatives of nature in the city, bringing beauty and offering a reprieve from the built environment (9). According to a study in Portland, Oregon, the sale prices of homes with street trees increased by an average of \$8,870, while a tree in the front yard added, on average, an additional \$7,130 (10).



Cultural: Trees can hold special cultural, religious, or symbolic meaning (9). A maple tree may remind us of our Canadian heritage, a good climbing tree can capture the imaginations of children, a memorial tree may serve as a living testament to a loved one, and established street trees can act as landmarks defining a neighbourhood or giving us a sense of home.

Environmental: Although some urban areas tend to rely heavily on a handful of non-native planted species, urban forests often display relatively high biodiversity and provide habitat for other native plants and wildlife (11). Therefore, urban forestry plays an important role in managing invasive species, promoting native species, and preserving the integrity of the regional ecosystem (11).



FOREST PROFILE

Augustana Neighbourhood

- Total inventoried trees in the neighbourhood:

2,744

This includes 2,172 privately owned trees and 572 public trees.

- The 3 most common species are:

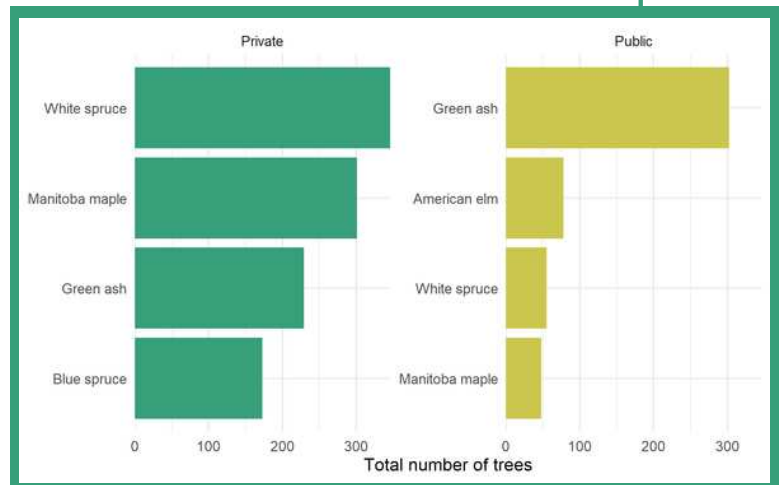
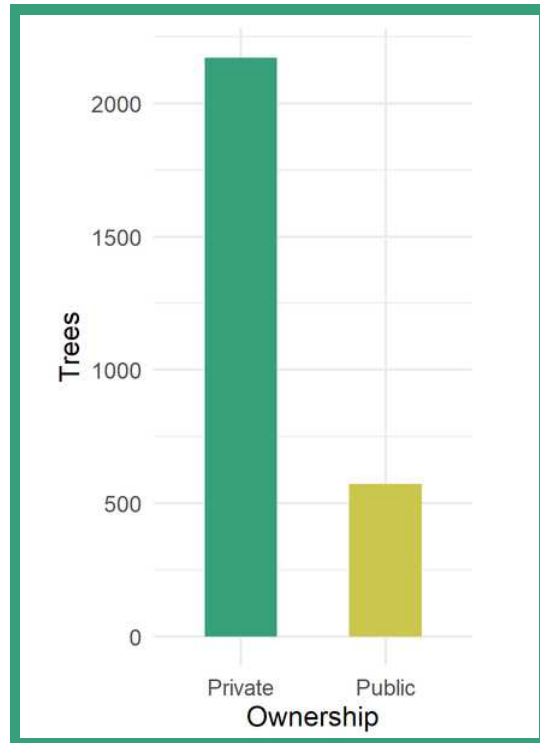
Green Ash - 531

White Spruce - 401

Manitoba Maple - 349

- The neighbourhood has an average of **10.5** trees per lot.

- There are approximately **335** fruit trees in the neighbourhood.



Fruit Trees in Your Neighbourhood



Do you have more fruit than you can use? Are you looking to harvest local fruit? Camrose Fruit Share is a website launched through an Augustana Sustainable Food Endowment award in 2019. The site aims to increase awareness about local food, reduce food waste, and develop community by connecting people who want to pick fruit with local fruit tree owners. Membership is free! Visit www.camrosefruitshare.ca or email admin@camrosefruitshare.ca for more information.

- **CONFLICTS** We assessed each tree for potential conflict with utility wires and sidewalks. Conflict between trees and these two essential pieces of public infrastructure can frequently lead to tree removal before maturity. We looked at both existing conflict and potential conflict over the next 5 years.

Sidewalks:

- 67 existing conflicts
- 98 potential conflicts

Utility Wires:

- 482 existing conflicts
- 153 potential conflicts

Most of these conflicts can be mitigated with planning for the right tree in the right place, pruning trees, and if the opportunity exists, re-aligning infrastructure as pictured here.



- **NOTABLE TREES**

Highest annual functional value: **\$222**

White spruce on 48th Street

Largest stem: **102 cm** American elm on 47th Street

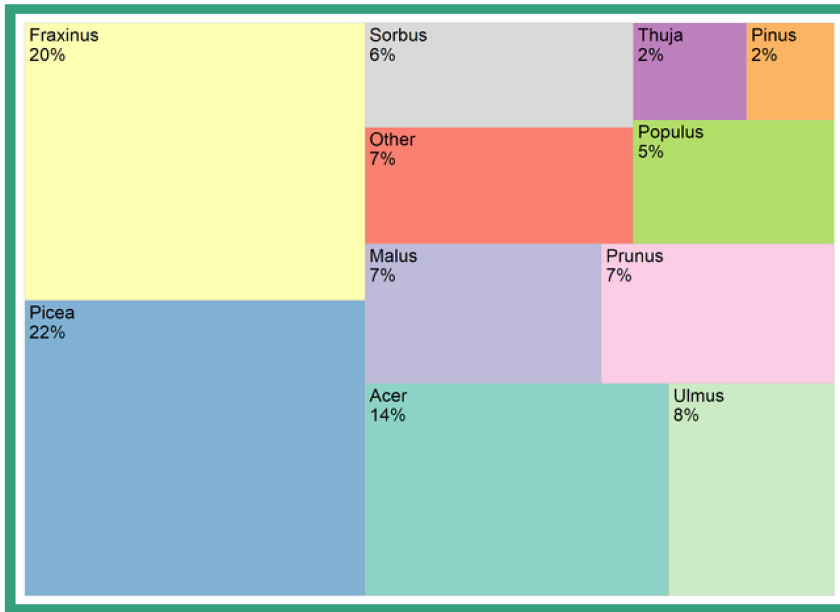
Highest structural value: **\$15,090**
American elm on 47th Street

Largest canopy: **7,020 m³**
American elm on 45 Street

Tallest tree: **25 m**
Cottonwood on 45 Street



SPECIES DISTRIBUTION



These are the most common genera found in the neighbourhood. The "Other" category includes all genera with less than 50 individuals (i.e. less than 2% of total trees).

To help with recognition in your yard and as you walk through the neighbourhood, these are the most common species from each genus and an example of the leaf. More information is available on Natural Resources Canada Trees Guide (link: <https://tidcf.nrcan.gc.ca/en/trees>).



Fraxinus - e.g. green ash



Prunus - e.g. choke cherry



Picea - e.g. white spruce



Populus - e.g. aspen



Acer - e.g. Manitoba maple



Sorbus - e.g. mountain ash



Ulmus - e.g. American elm



Thuja - e.g. cedar

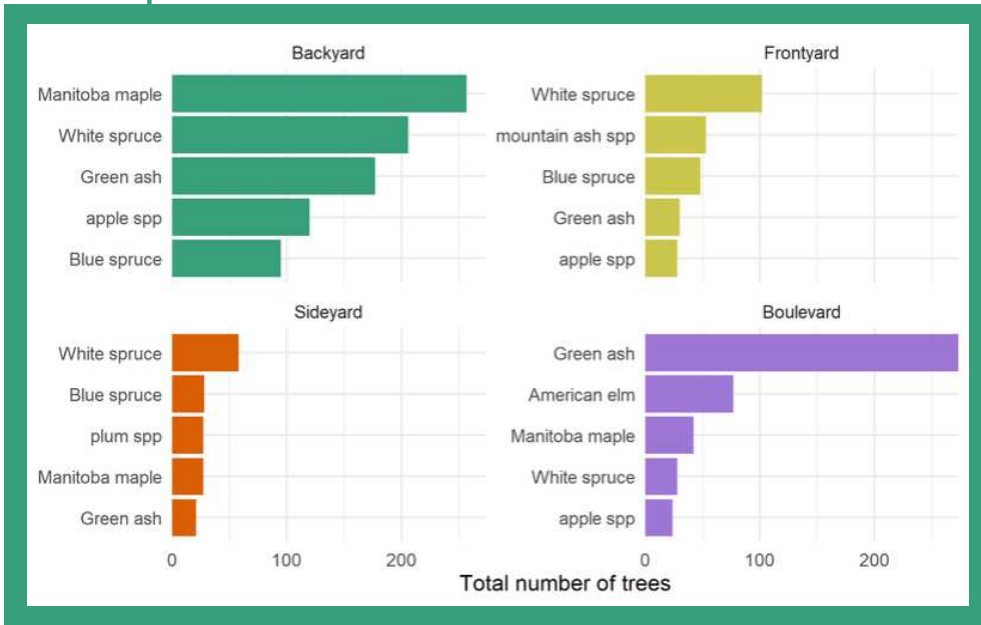


Malus - e.g. crab apple



Pinus - e.g. lodgepole pine

*Images provided by Natural Resources Canada, Canadian Forest Service (12).



The most common species found in different parts of properties across the entire Augustana neighbourhood.

RISK FACTORS

Invasive Species: Emerald Ash Borer

A major and imminent risk to the neighbourhood's trees is the emerald ash borer (EAB), an invasive wood-boring beetle that kills most species of North American ash (*Fraxinus* sp.). It has devastated forests in eastern North America, contributing to billions of dollars in economic impacts, including lost landscape value, tree removal, and replacement costs. Green ash is the most common tree in the neighbourhood and an outbreak would lead to removal of more than 500 trees which would drastically change the character of the neighbourhood (see image below). As of 2017, EAB was found in Winnipeg and will likely arrive in Camrose in the next 3-10 years. Planning for the arrival of EAB should begin now and early detection and monitoring of ash trees is an essential part of that strategy.



DATA ANALYSIS

Quantifiable Environmental Benefits

Based on measurements collected from trees in the Augustana neighbourhood, we used the [iTree Eco program](#) to calculate estimates of environmental benefits. The benefits quantified through our research are grouped into two categories, structural and functional, which we will explore in the remainder of the report.

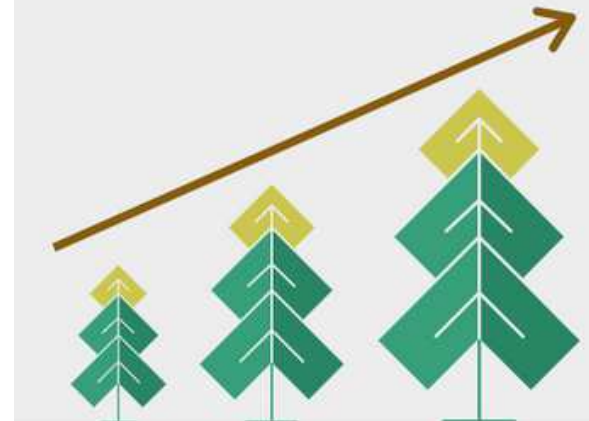
Please keep in mind that the values presented are conservative estimates based solely on capturing quantifiable services (carbon sequestration, air pollution, storm water, and energy savings) from the iTree program. At this time, these do not include any of the social related benefits that were mentioned on pages 3 and 4.



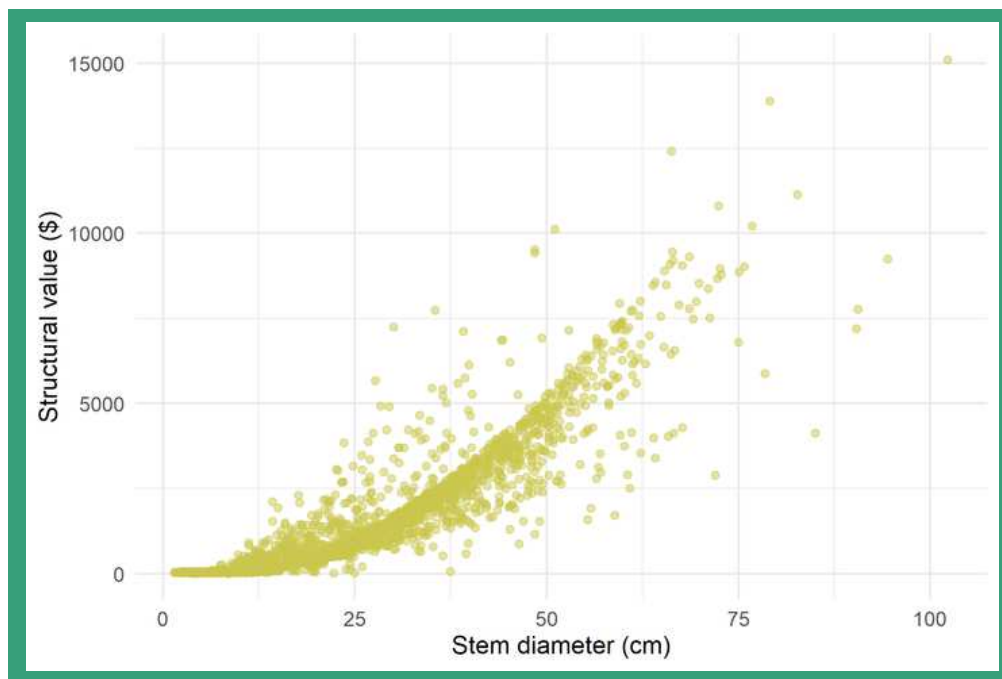
STRUCTURAL BENEFITS

Structural benefits have accumulated over the lifetime of the tree and can be interpreted as the approximate replacement value of a tree.

BENEFITS OF LARGE TREES

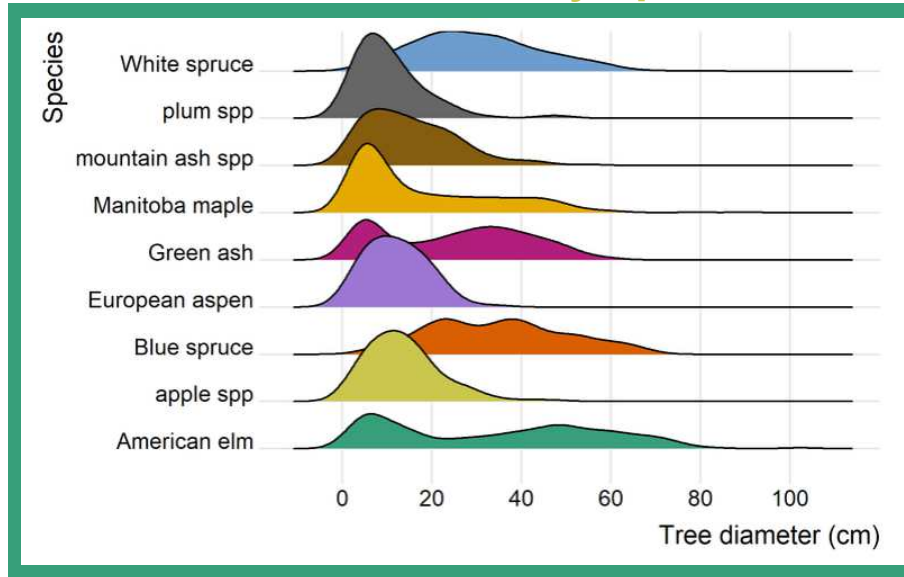


Neighbourhood Tree Size Vs. Structural Value



As you will likely notice, all benefits increase with the number and size of trees! The relationship between tree size and benefits reveals there is value in planting more trees, but perhaps more importantly, there is immense value in protecting large trees while doing our best to care for newly planted trees so they can grow to their full size and provide ever-increasing annual benefits as the tree grows.

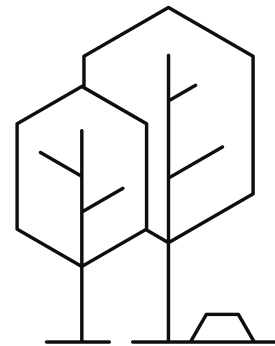
Trunk Diameter by Species



This figure shows the range of current tree size for species with more than 75 individuals in the neighbourhood.

STRUCTURAL VALUES

This is how much it would cost to replace these trees with ones of similar size and age



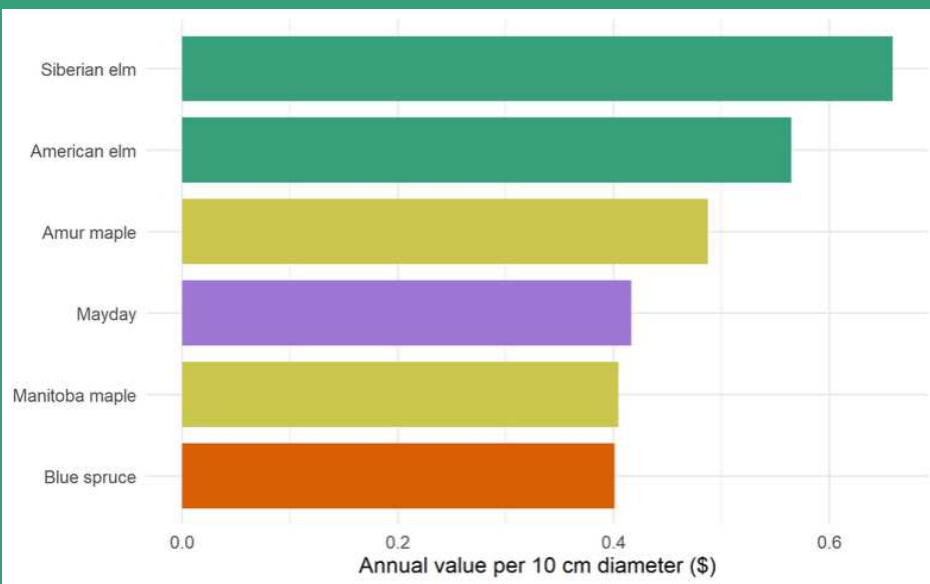
- The total structural value of all trees in the neighbourhood, is: **\$3,903,200**
- Approximately **70%** of these benefits are provided by private trees.
- The average structural value for a property within the neighbourhood is: **\$15,000**

FUNCTIONAL BENEFITS

Functional values are based on the ecosystem services that trees perform. They are calculated and presented as annual values.

- The total annual functional benefit from the neighbourhood's trees is: **\$63,900/year**
- The average annual functional value for a typical property in the neighbourhood is: **\$245/year**

Avoided Runoff



Species that contribute the most economic value from avoided runoff. Values are represented as annual amounts per 10 cm diameter. Colours represent the genus of each tree.

Surface runoff during precipitation events can be of concern for urban areas. It can potentially overwhelm stormwater systems and can contribute pollution to local creeks and lakes. Trees reduce surface runoff by intercepting rain and by promoting infiltration and storage via their root systems. This can offset the need for large investments in stormwater infrastructure.

- The total amount of runoff reduced by the neighbourhood trees is: **1,190 m³/year**

Carbon Sequestration

As trees grow they store carbon while producing oxygen via photosynthesis. This means that trees reduce the amount of carbon in the atmosphere by sequestering it in new growth. The amount of carbon stored depends on the species and increases with the size and health of a tree.

- The total amount of carbon sequestered by neighbourhood trees is:

13,370 MT/year

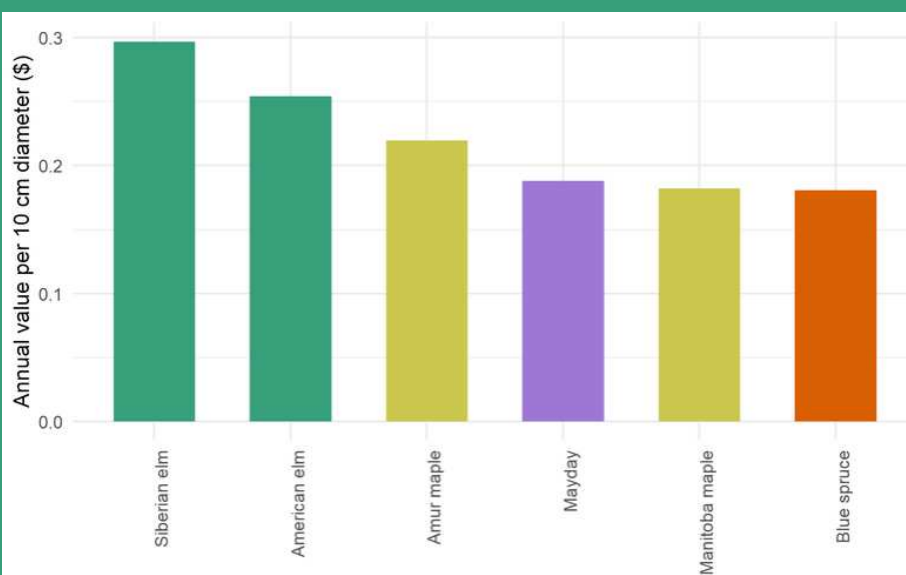
These two figures show the species that contribute the most economic value from carbon sequestration and air pollution removal, respectively. Values are represented as annual amounts per 10 cm diameter. Colours represent the genus of each tree.

Air Pollution Removal

Urban forests improve air quality by removing pollutants from the air. The major pollutants that trees trap include particulate matter less than 2.5 microns (PM2.5), ozone, nitrogen dioxide, sulphur dioxide and carbon monoxide, all of which can have impacts on human health.

- The total amount of air pollution removed by the measured trees in the neighbourhood is:

341 kg/year



Energy Savings

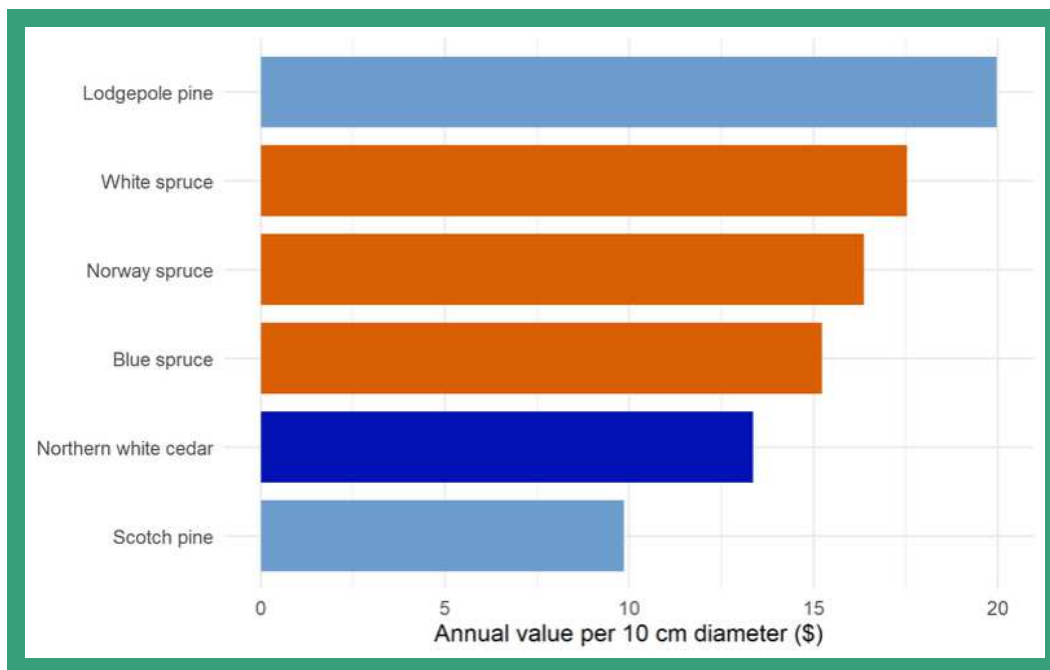
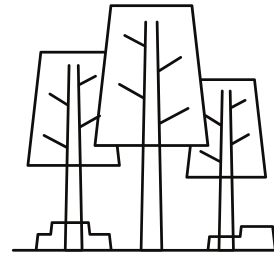
Well-placed trees can offset residential energy consumption and reduce carbon emissions by reducing power-plant usage. In the summer, trees shade buildings and also release water into the atmosphere that helps to reduce air temperatures. In the winter, well-placed trees can reduce heat loss by blocking winter winds. All trees usually decrease energy usage in the summer, but can decrease or increase winter energy use depending on placement and potential winter shading. The estimates of tree effects on energy use are based on measurements of distance (less than 18 m) and direction to residential buildings.

- The trees of the neighbourhood represent a total energy savings* of:

\$46,480/year

- In addition, the trees contribute to an offset of 102,820 kg of carbon which has an associated value of:

\$11,810/year



Species that contribute the most economic value from total energy savings. Values are represented as annual amounts per 10 cm diameter. Colours represent the genus of each tree.

*These estimates are based on a price of \$0.18/kWh for electricity and a price of \$3.68/GJ for heating (incorporating both costs and delivery charges).

CONCLUSION



This report is an invitation and a starting point for residents to get to know their neighbourhood urban forest. Thank you for working with the Augustana Tree-Ring Lab and allowing us to identify and measure trees throughout your yards and neighbourhood! The enthusiasm and participation of residents is an important part of a successful community-driven research process. We look forward to further discussions, thoughts, questions, or ideas around this inventory.

Our hope is that this report will inspire even greater recognition for the urban forest, increased awareness of the critical benefits they provide, and for its sustainable and scientifically-informed management.

Do you have questions, comments, or want to learn more?

Contact Greg King

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Instagram: <https://www.instagram.com/prof.gk/>

LinkedIn: <https://www.linkedin.com/in/profgk/>

NEED HELP WITH YOUR TREES? CALL A CERTIFIED ARBORIST

This is a list of ISA certified arborists who will visit Camrose for tree care

DAVEY TREE EXPERT CO. OF CANADA, LIMITED

Kevin Cassells, ISA Certified Arborist - District Manager for Edmonton, Serving all Alberta
Phone: 780.433.8733
Fax: 780.569.0086
www.daveytree.ca

TREE NINJA INC.

Benoit Boudreau, ISA Certified Arborist PR-5146A
Edmonton, St. Albert, Sherwood Park & Camrose
Phone: 825-510-9911
Email: info@treeninjaedmonton.com
<https://treeninjaedmonton.com/>

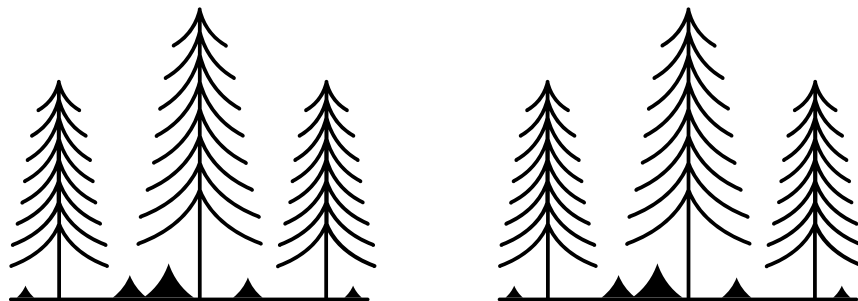
GREEN GROWTH INDUSTRIES, LTD.

Jonathon Kozuback , ISA Certified Arborist
Serving Red Deer and surrounding, incl. Camrose
Phone: 403-318-7226
Email: ggrowthindustries@gmail.com
<https://www.ggi-ltd.com/>

ZENITH TREE SERVICES

Jesse MacDonald, ISA Certified Arborist PR 4859-A
Will work with Camrose homeowners
Phone: 780-297-0580
Email: zenithtreeservices@gmail.com
www.zenithtreeservices.ca

Other options may exist. Check <http://www.isaprairie.com/find-an-arborist/alberta-isa-certified-arborists> for a complete list of certified arborists and companies who operate in Alberta.



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