

State of the Urban Forest 2020

Forestry & Pest Control Operations
Parks and Open Space Services Branch
Parks, Recreation & Cultural Services Department
City Planning & Community Development Division

City of Regina



REGINA
Infinite Horizons

THE IMPORTANCE OF TREES In Regina

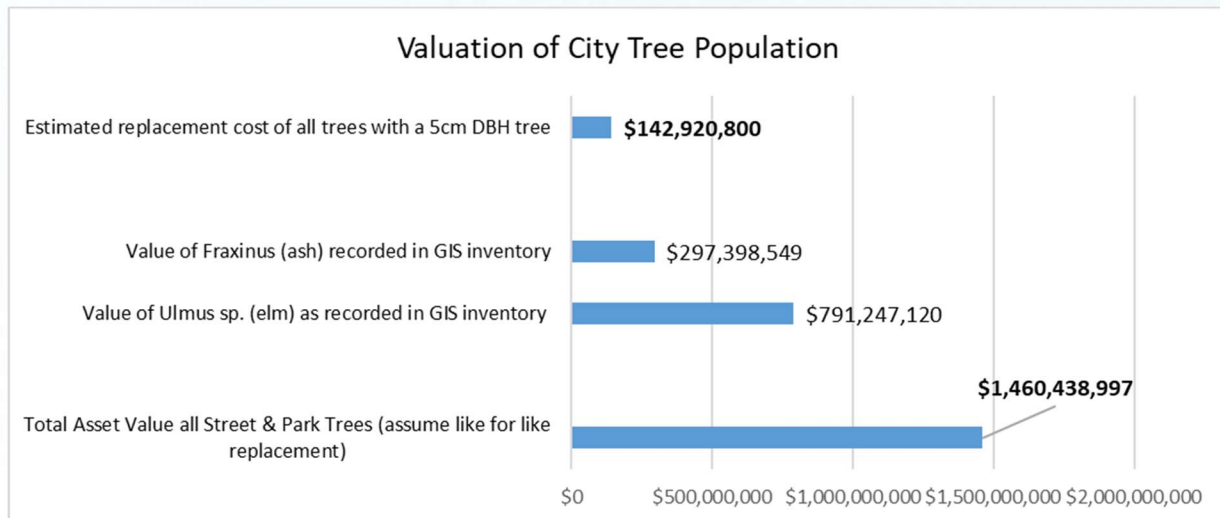
The Benefits of Our Trees:



* The City of Regina was one of 68 cities recognized worldwide as part of the Inaugural 2020 Class of Tree Cities of the World. The Tree Cities of the World Program is a combined effort with the United Nations Food and Agriculture Organization and Arbor Day Foundation.

Community & Urban Forest Measures

Valuation Estimates of Regina's Urban Forest



Values are population estimates only as recorded inside of the current GIS inventory (December 2020).

Assessed values are determined by:

- species ratings as determined by the Alberta Tree Ratings Guide (2003);
- this valuation on masse assumes 85% site condition rating;
- this valuation on masse assumes 85% overall health condition;
- cost per cm² DBH (\$12.26/cm²).

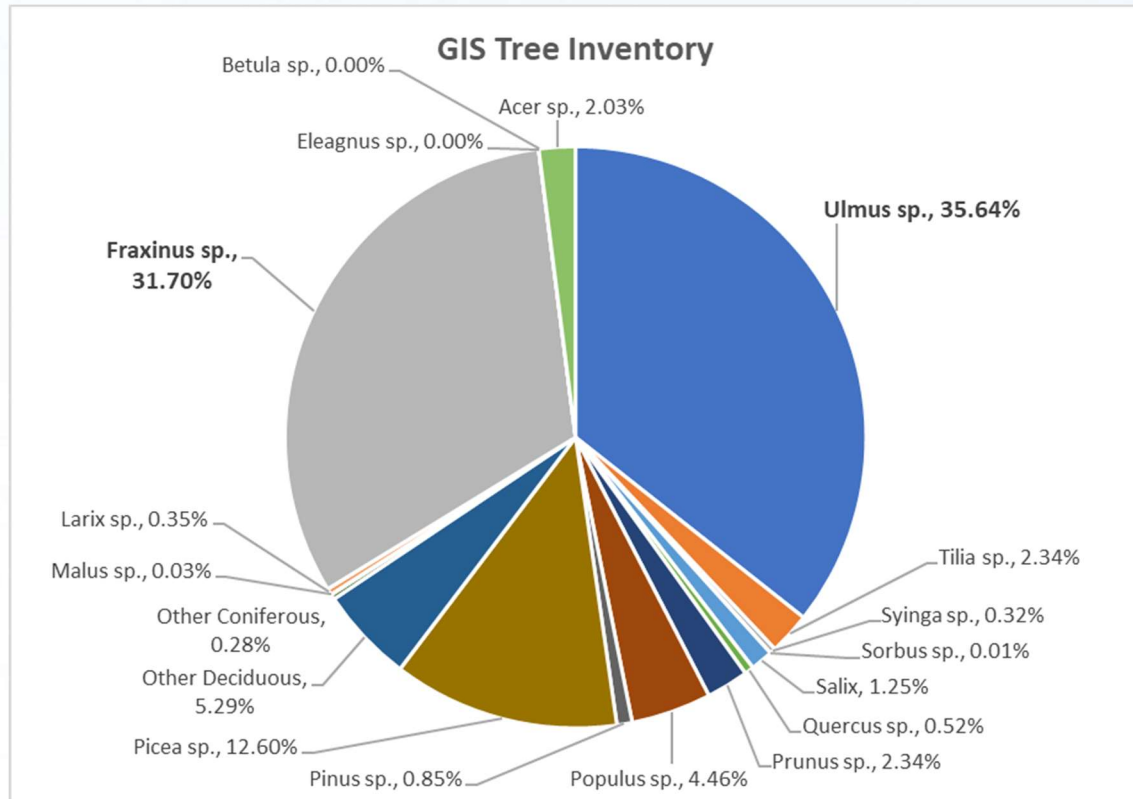
Note: At the time of an assessment of an individual tree, a formal condition and site assessment are made at that time.

Regina Forestry Bylaw (2008-48) - Any tree removed for development purposes the requestor is charged 20% of the assessed value or \$500 whichever is greater. This funding is then used to plant a minimum of two replacement trees. (*Regina Urban Forest Management Strategy (July 2000)*)

Estimated replacement cost is \$800 per tree. Breakdown is as follows:

- Average unit cost & install of a 5-10 cm tree = \$500
- Estimated establishment costs for minimum three years = \$300 (primarily watering)

Tree Species Diversity

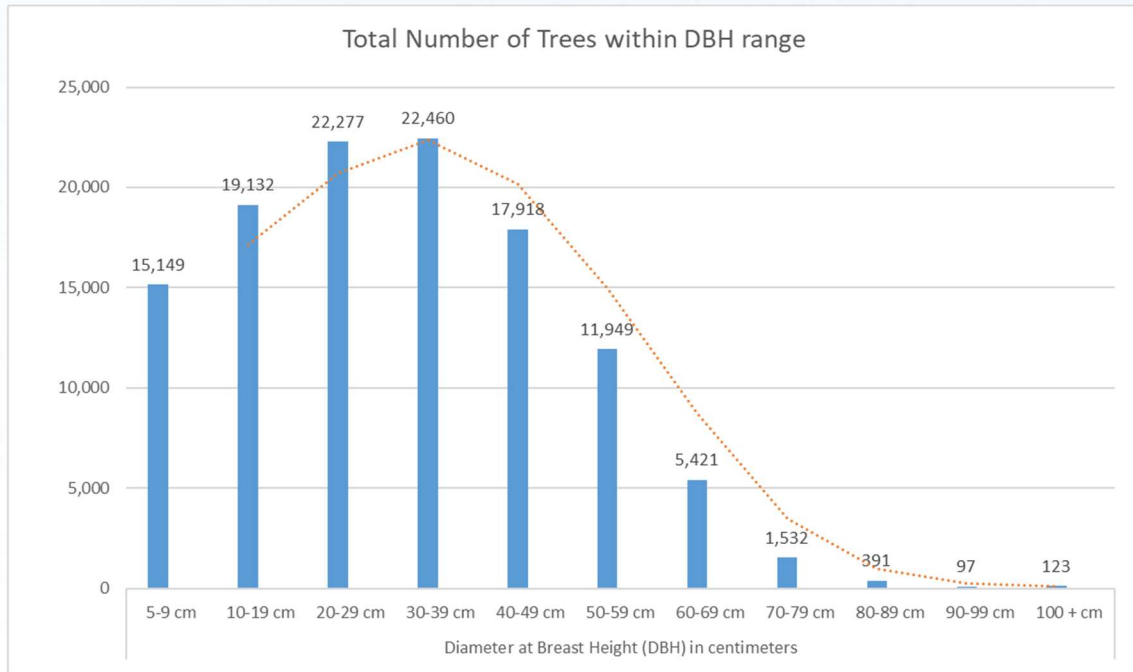


This is the total tree species diversity managed by City of Regina - as recorded within the GIS tree inventory database as of December 11, 2020.

- Inventory primarily based on residential street trees and approximately 85% of “NAMED” park spaces. Buffers and open spaces are not yet entered.
- Total trees recorded within GIS inventory = 114,851
- Approximately 64% of the total street tree and park tree inventory is recorded by GIS currently.
- Due to the Covid-19 issue there was not a concerted effort to add additional trees to the inventory. In a typical year, additional trees are added in the fall of each calendar year and is dependent on funding available.
- During 2020, additional species options, were added to the field lists in GIS. Examples include but not limited to: *Malus sp.* *Sorbus sp.* or *Betula sp.* Many of these were previously recorded as other deciduous trees in previous years.

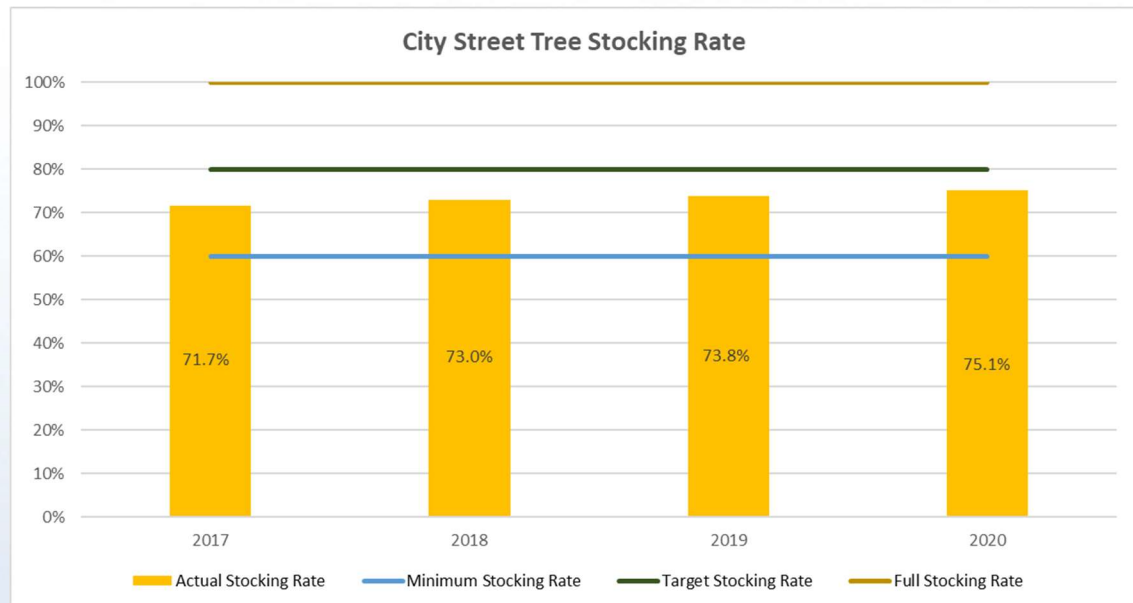
Regina Urban Forest Management Strategy (July 2000) - Sustainability goal is no more than 25% of any one genus within City (specific area). Prior to 1989, majority of plantings were predominately monocultures of *Ulmus* (elm) or *Fraxinus* (ash).

Size Distribution of Regina's Urban Forest (GIS)



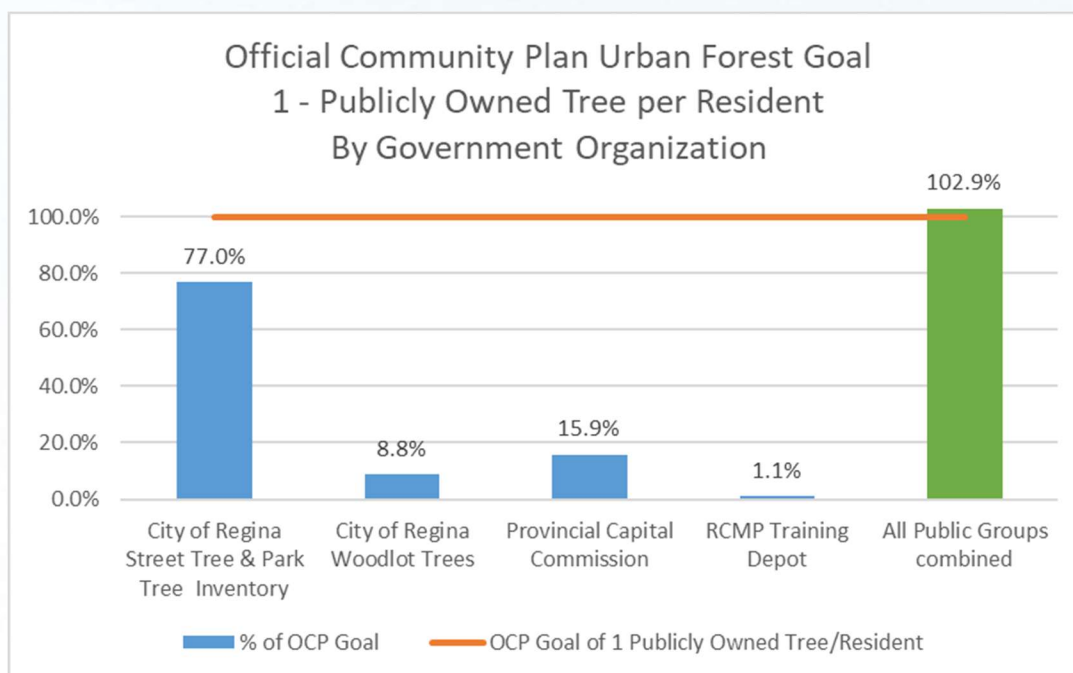
Within GIS records - Trees with a Diameter at Breast Height (DBH) of 70 cm or greater comprise the top 2% of largest trees in the City of Regina. The most juvenile trees (smallest) with a DBH of 9 cm or less comprise 13% of current inventory.

Stocking Rate of Street Tree Inventory



Stocking Rate - is defined as the number of trees planted vs the total number of possible planting spaces (Journal of Arboriculture, Richards, 1992). Regina's street stocking rate is estimated at 75%. The 2020 increase is due to a data clean of points within GIS on single dwelling units. Park plantings do not easily fit this measure as current plantings versus possible locations cannot easily be defined.

Public Trees to Official Community Plan

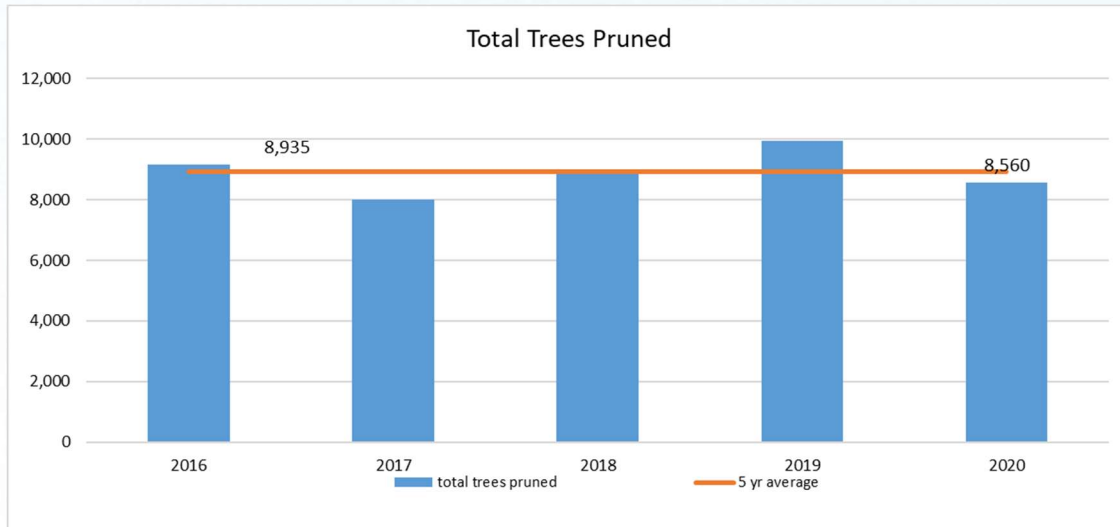


Regina's Official Community Plan (2013) - Environment Goal 4.7.1 - Increase the urban forest to one tree per person in public spaces.

- **City of Regina street & park tree inventory = 178,651 trees.**
 - Assumes 2001 MCSII inventory is correct =161,836;
 - plus 2002- 2011 net tree change = +4,407;
 - plus 2012 to present net tree change = +12,408.
 - In future years, the inventory processes will either verify or nullify this assumption.
- **“Woodlot” trees = 20,491 trees.** This classification is a new add for 2020 as the trees on properties are recognized for their environmental value. The trees are located on properties owned by the City of Regina. These properties include the Dewdney West Tree Nursery, the Kings Park area; including Torr Hill and Murray Golf courses. The tree counts were obtained through geospatial satellite analytics services provided by *Western Heritage Inc.* during 2020. Next analytics service of this type will be scheduled in 2030 or if a significant change happens to the properties.
- **Provincial Capital Commission = 38,783 trees.** Source GIS Tree Inventory records as supported by City of Regina Geospatial Services. City of Regina provided \$2.72 million in funding during 2020 in support of Wascana Park maintenance operations. Source: 2020 City of Regina Budget.
- **RCMP Depot = 2,592 trees.** This value is based on geospatial satellite analytics services provided *Western Heritage Inc.* concurrently during the woodlot tree analysis.
- Regina's population (start of 2020) = 238,132 - Source MBN Canada.

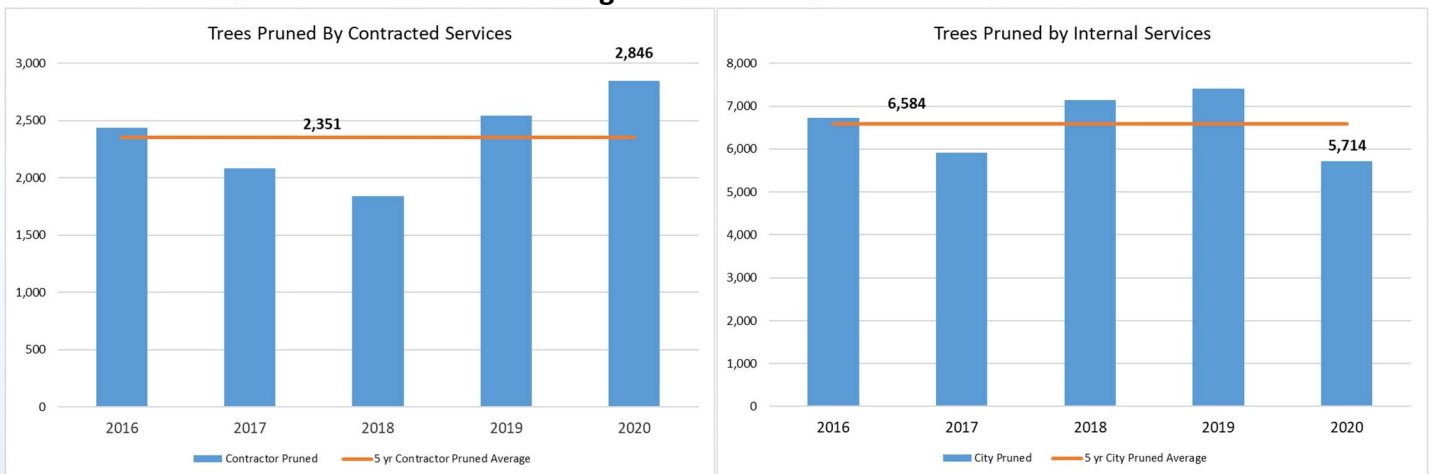
Urban Forest Maintenance

Tree Pruning



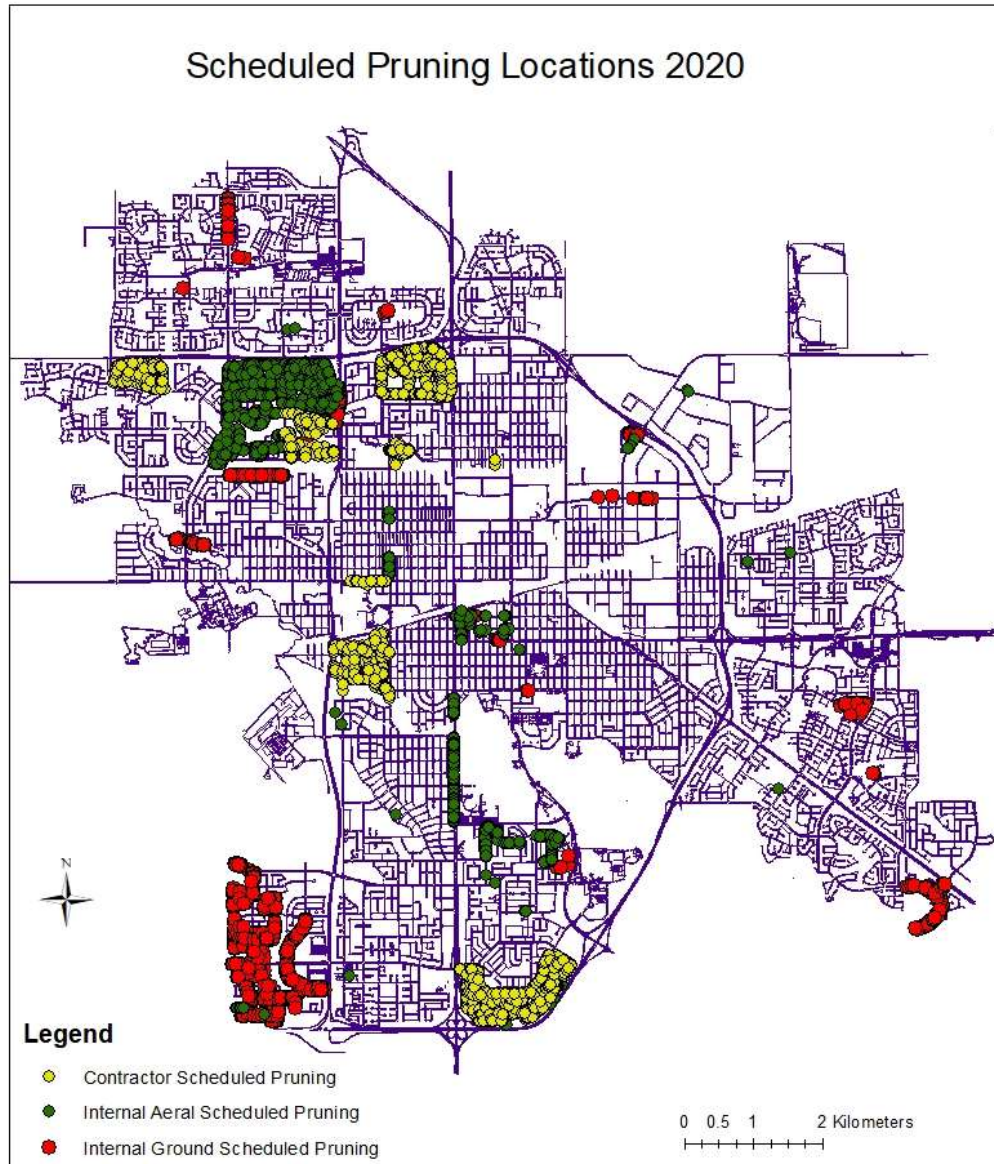
Includes the following work codes - Internal Scheduled Pruning (aerial & ground), Service Requested Pruning (aerial & ground), Broken Branch Pruning, Public Works Pruning and Contracted Services. A total of 8,560 trees were pruned during 2020.

Contracted Versus Internal Pruning



Internal pruning was reduced in capacity during 2020 due to the Covid-19 pandemic. Staffing levels were reduced, with some permanent staff being reassigned to complete seasonal capital work (tree planting / plant establishment) to cover for seasonal staff shortfall. In addition, storm events and subsequent response negatively impacted scheduled pruning activities during the summer period.

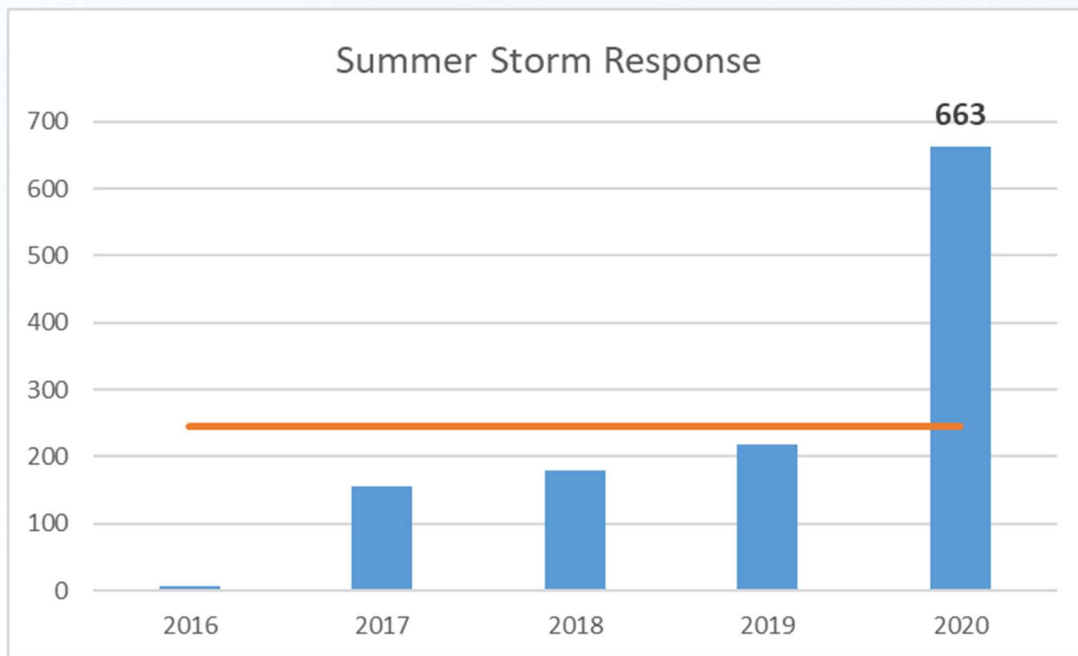
Scheduled Pruning Locations with Regina



Locations shown are recorded by field staff within the ArcGIS Collector™ app while completing scheduled pruning.

This does not include any service requested pruning, public works pruning, broken branch pruning as those are dealt with on an ad hoc basis. While these are also recorded within ArcGIS Collector™ by field staff as these types of jobs do not show any real discernable pattern of location.

Summer Storm Response



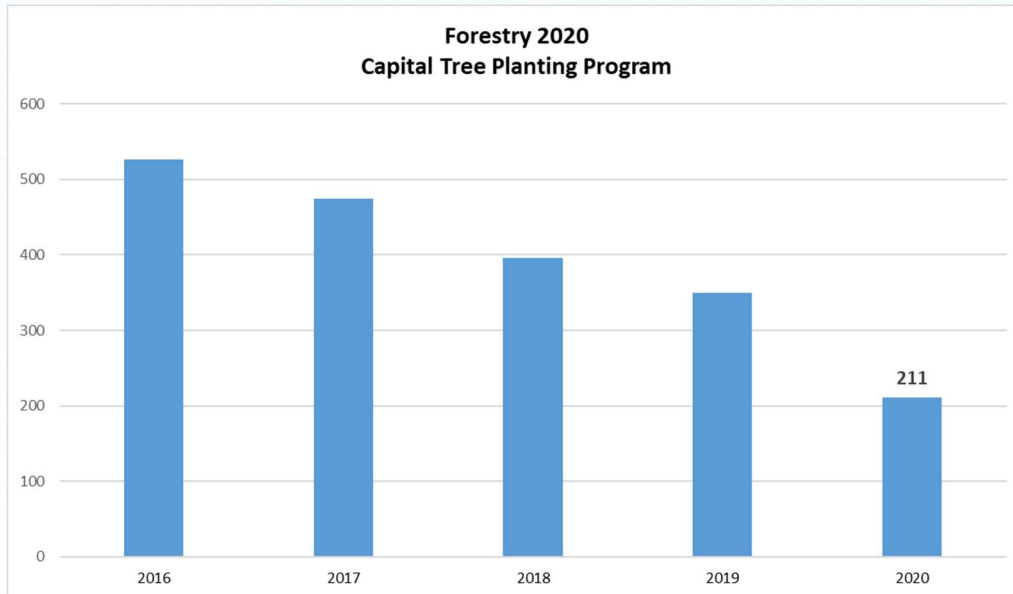
A total of 663 trees were serviced for summer storm related weather events. During late May and June, there were four separate occasions with recorded wind gusts reaching or exceeding 80 Km/hr (Source Environment Canada). Of the 663 trees responded to:

- 63 trees were removed for safety reasons;
- 600 trees were repaired to a safe status.

The 2020 total number of trees repaired or removed for storm events is more than the previous four years combined. Most of the response can be narrowed down to the months of May and June (530 trees). Storm response by volume for 2020 did negatively impact scheduled activities during late May and all of June.

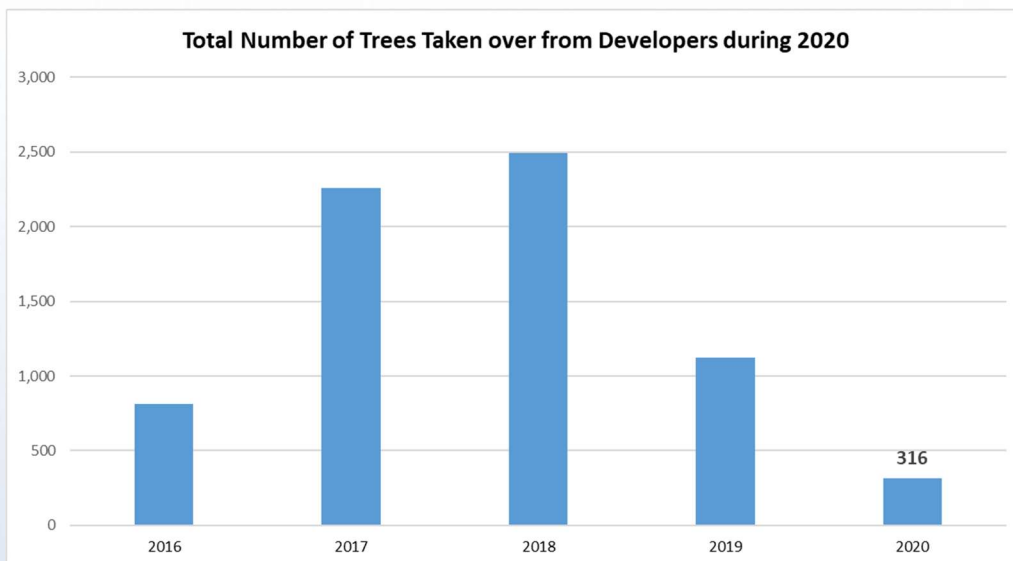
New Tree Planting & Diversity

Internal New Trees



For 2020 the annual capital budget allocation was \$94,000. Covid-19 pandemic negatively impacted seasonal staff required for this program and some projects were delayed. Of the trees that were planted, installation was completed by staff who were reassigned from other tree maintenance operations.

Developer New Trees



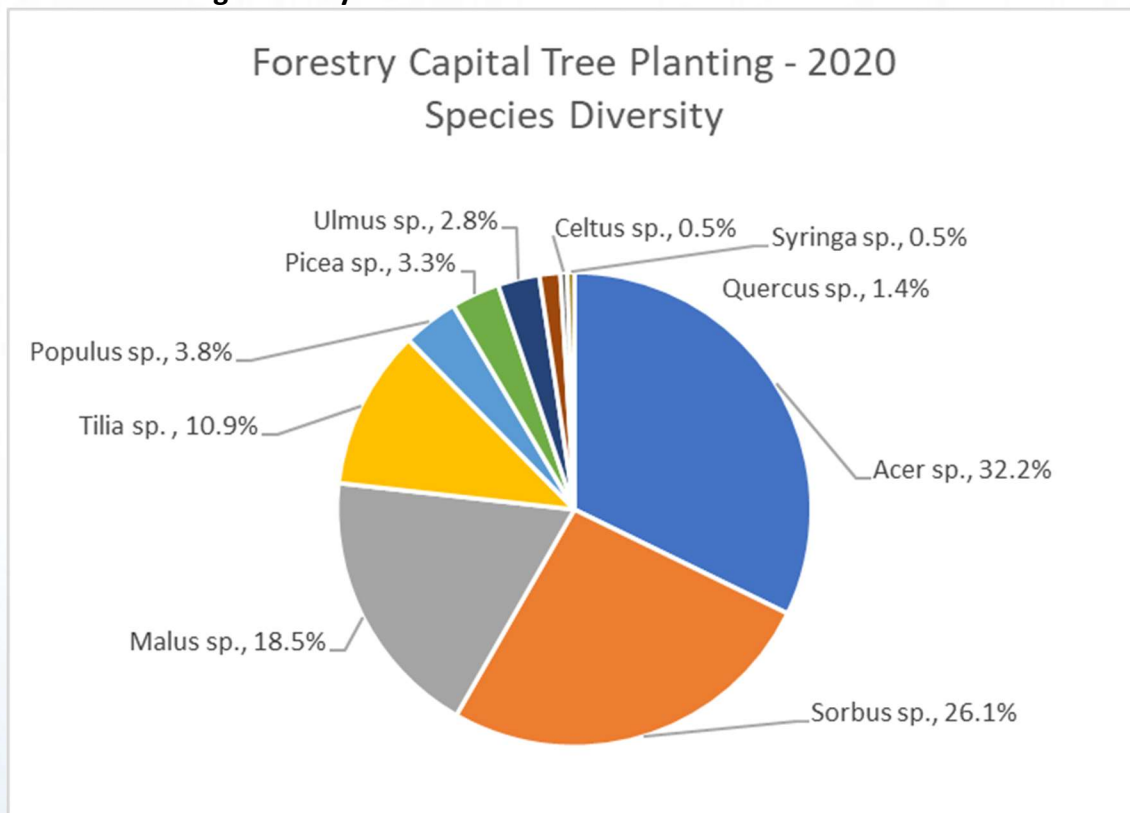
There were 316 trees recorded within GIS as Developer Takeover throughout 2020. Any trees under developer or direct contractor control are not reported until the City of Regina has issued "CCC2" takeover.

Current Planting Diversity

Regina Urban Forest Management Strategy (July 2000) - Sustainability goal is no more than 25% of any one genus within City (specific area). The document further specifies that for a park space, no more than 20% of any one genus is permitted. Prior to 1989, majority of plantings were predominately monocultures of *Ulmus* (elm) or *Fraxinus* (ash).

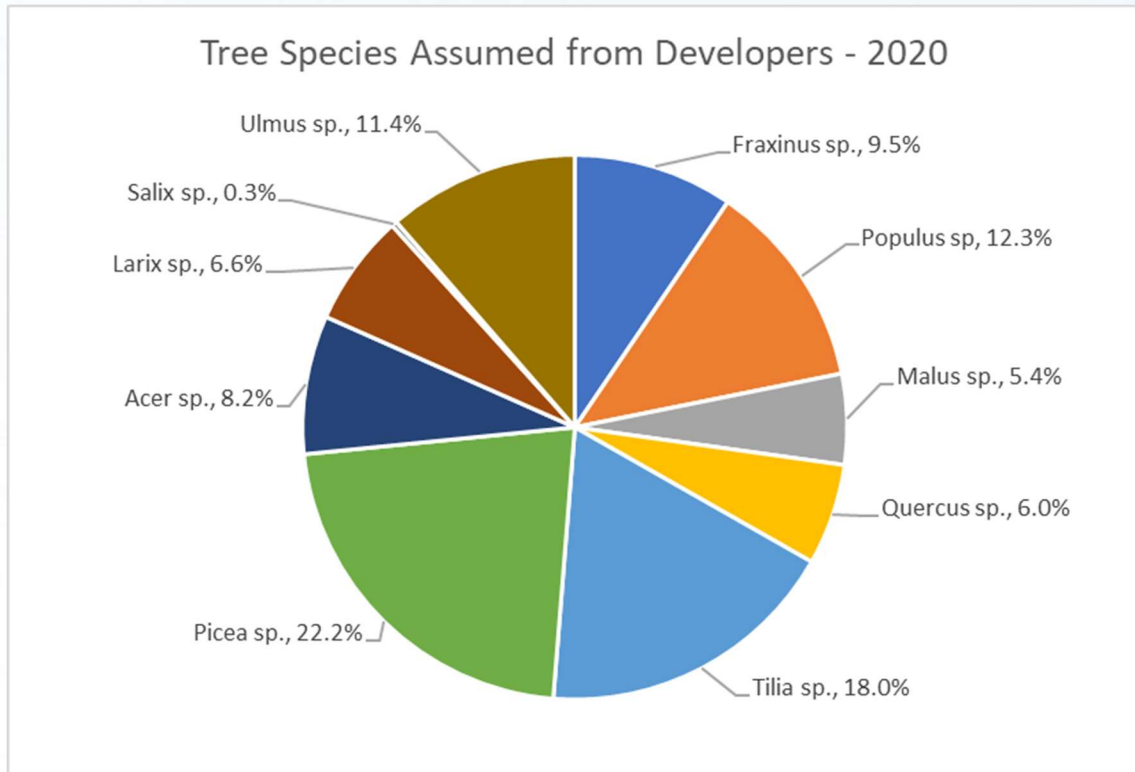
January 2018 – Due to minimizing future risk to Emerald Ash Borer, a decision to stop planting ash was made. As part of this decision, only trees that were previously approved that remained in the cue would be permitted for planting, as to not adversely affect the development community.

Internal Planting Diversity



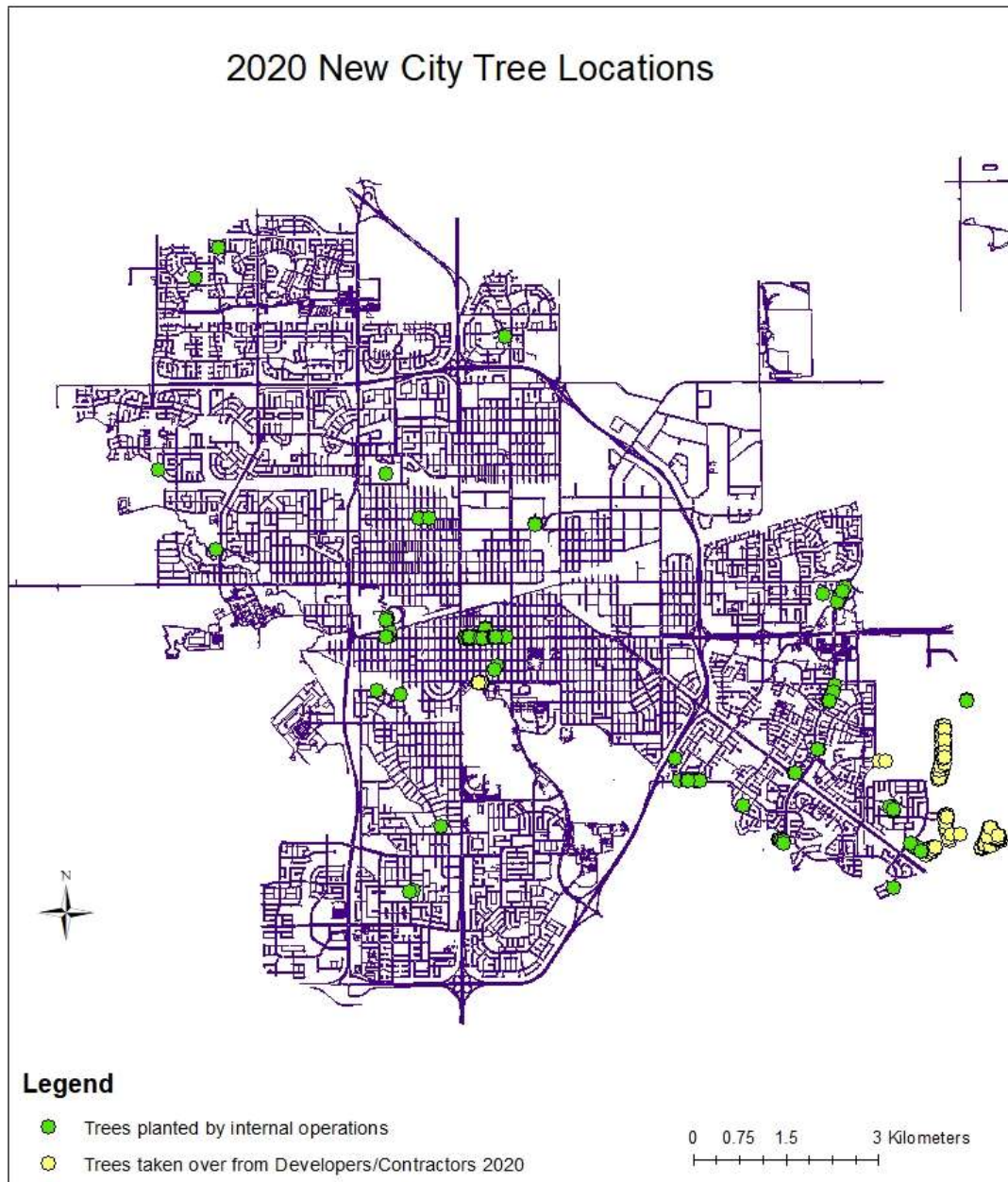
There were no *Fraxinus sp.* or *Ulmus sp.* planted by City of Regina crews during 2020.

Developer / Contractor Planting Diversity



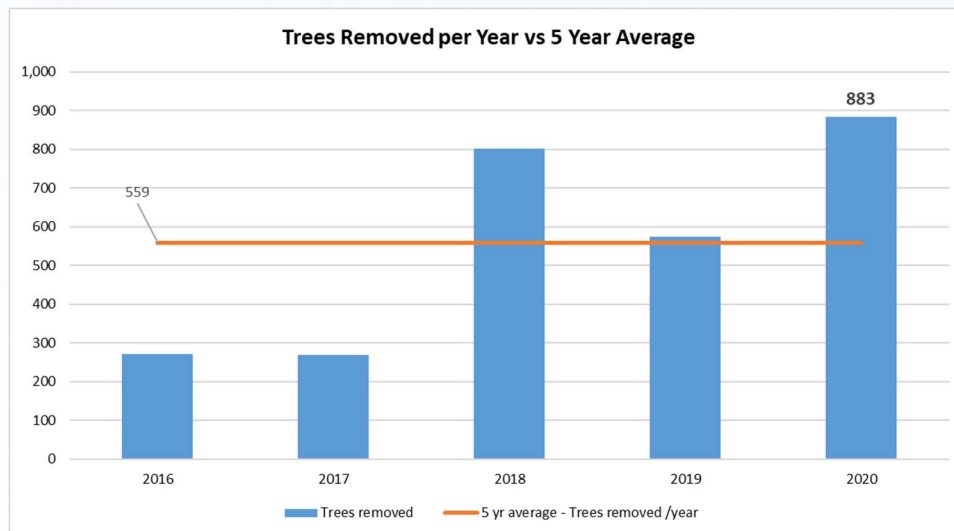
For this year the City assumed responsibility for 316 trees from developers or contractors. Total number of *Fraxinus sp.* (Ash) plantings assumed was thirty trees. This is the lowest number of *Fraxinus sp.* being accepted from the development community since the decision to remove future ash plantings was made.

New Tree Locations – Internal & Developer Combined

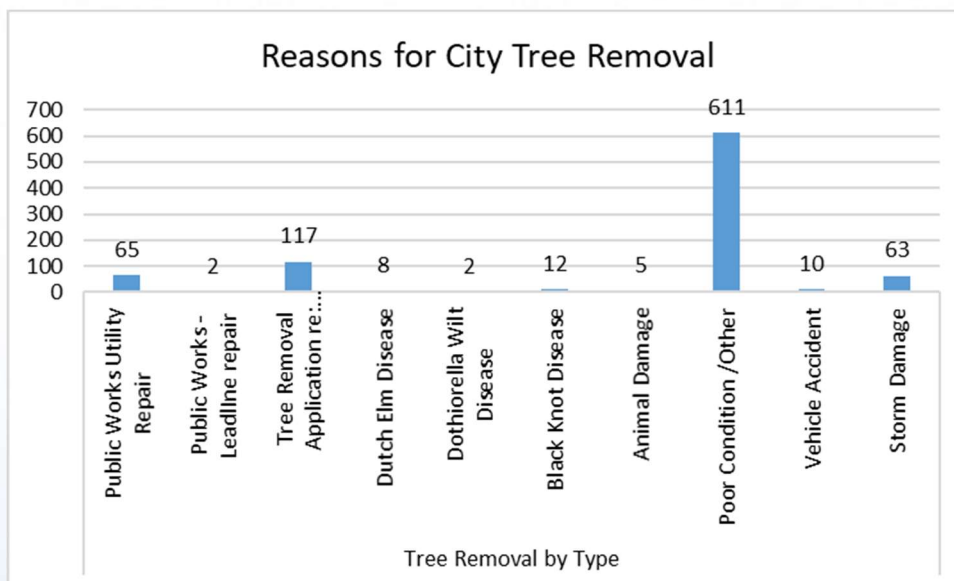


Victoria Ave Beautification Project in the Regina downtown was a highlight of the tree planting program. This included the installation of 80 trees as new center boulevard plantings. The project also included a first time custom individual tree irrigation system installed to help the trees better establish and survive the harsh environmental conditions experienced in a boulevard setting.

Forestry - Trees Removed



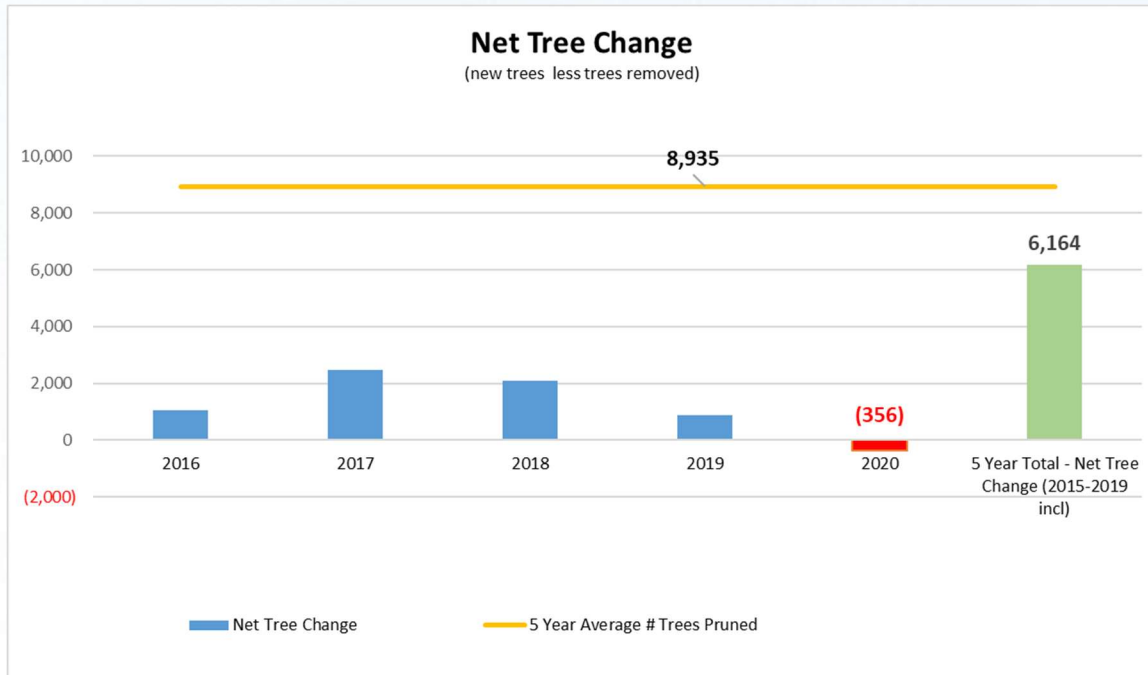
Tree removals by type



For 2020, trees removed were the highest on record. Much of the poor condition trees were impacted by the continuing four-year drought. Environment Canada reports that drought experienced during 2020 was the fourth lowest precipitation amount in the Regina area for 130 years. (204.4 mm for 2020 as compared to the normal average of 389.7 mm/year - Source Environment Canada)

August 2020, Forestry crews began to focus on buffer trees impacted by drought. During that month 300 trees were removed for poor/other condition. Illustratively the south Ring Road buffer near Whitmore Park saw 85 trees removed. There will be another focus on drought impacted trees. This will most likely be scheduled for August of 2021.

Net Tree Change to Urban Forest

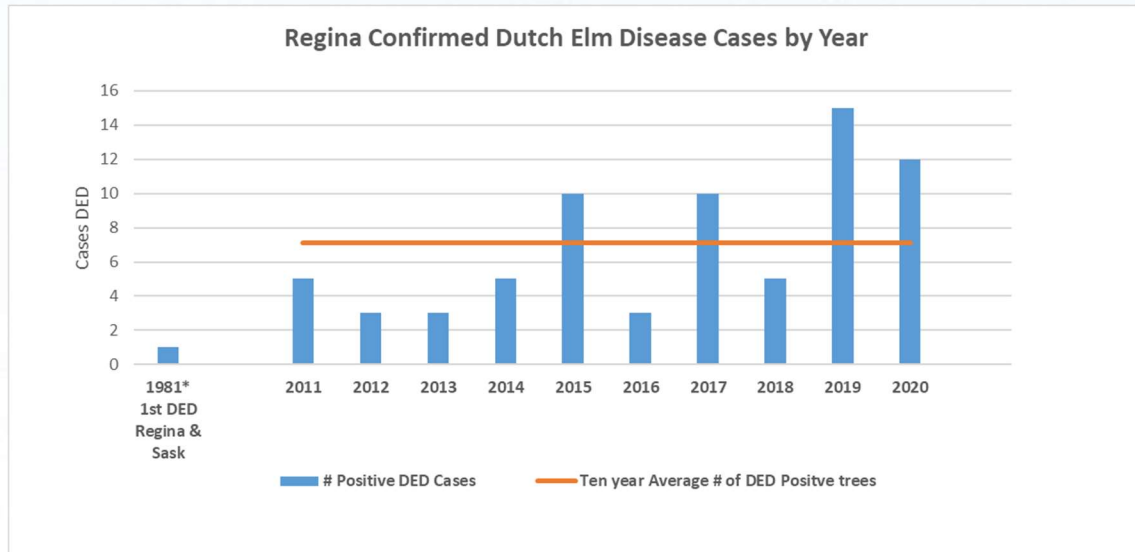


Net tree change is calculated from the total new trees (Internal City and Developer combined) minus total trees removed. When looking at the result the following is considered:

- For 2020 there is a net loss of 356 trees to the urban forest. This is the first year where removals have exceeded plantings in recent memory. This is a sign that 4 years of drought is negatively impacting tree population.
- 5-Year Total Net Tree change (6,164 Green) indicates the significance to inventory change over past 5 years.
- The 5-year average of trees pruned is 8,935 trees/year (Yellow). Pruning has exceeded the net 5-year net tree change. This is the second year in a row that the pruning cycle is shortening relative to tree population and overall forest growth.
- In a typical year, most new tree plantings are trees that have been assumed are from greenfield development. Takeovers have slowed from a peak in 2017 and is likely due to the decrease of the local building economy. Covid-19 is not directly considered a factor as these trees were most likely installed by a contractor one-year prior City takeover and prior to Covid arriving to Canada.

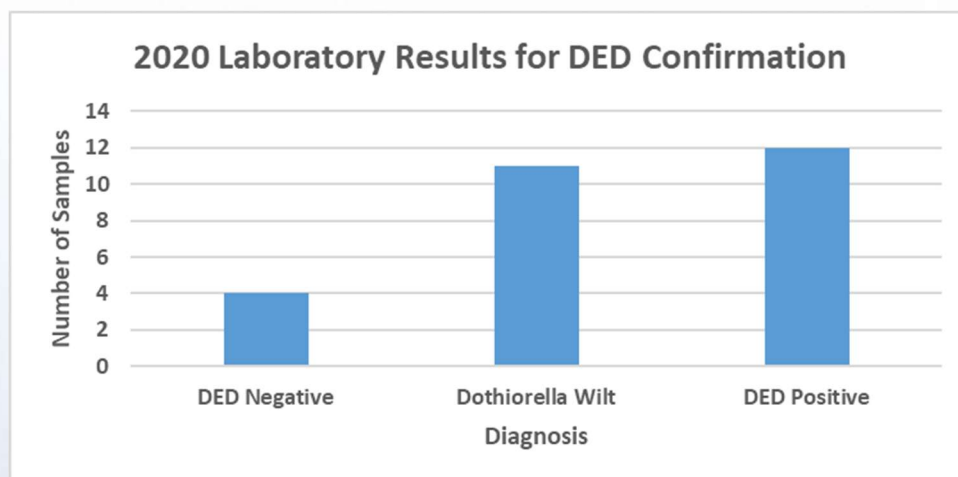
Pest Control Section

Dutch Elm Disease (DED) Incidences



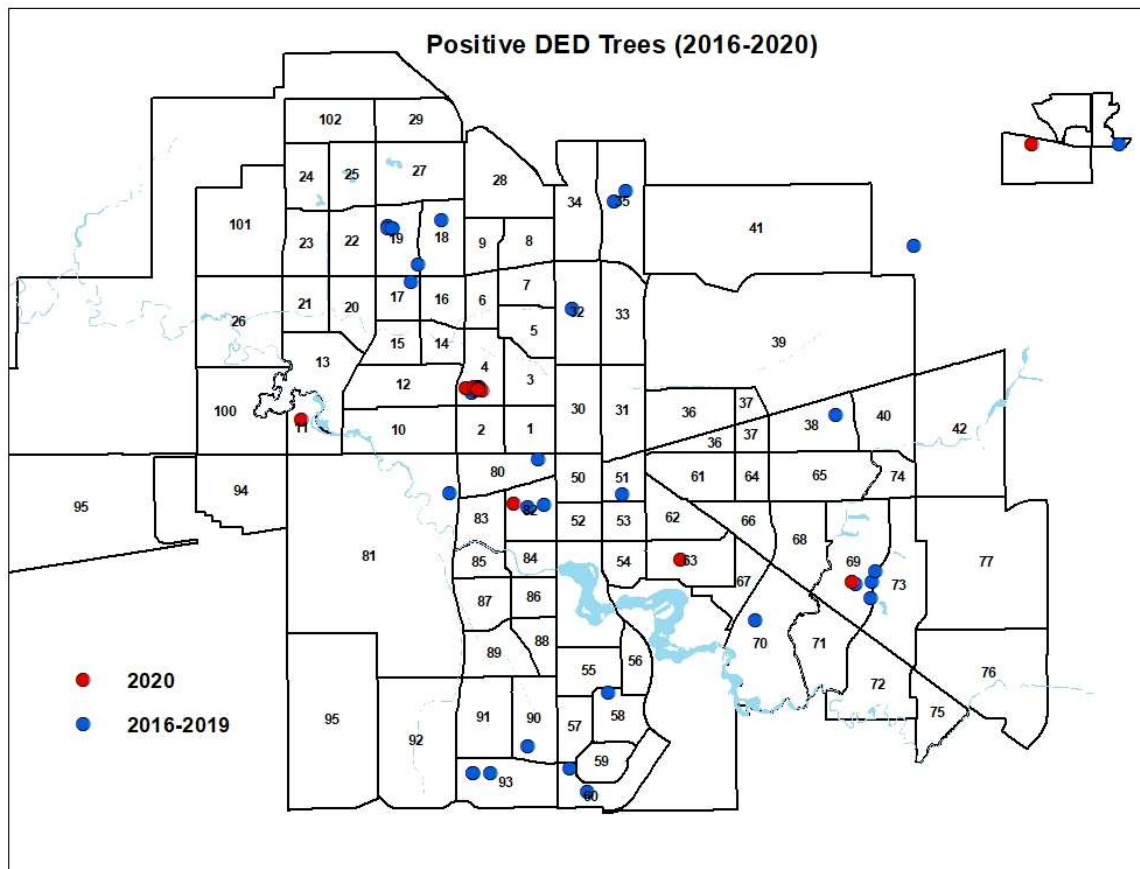
Twelve (12) trees were lost to Dutch Elm Disease during 2020. Of these eight (8) trees were located on City property and four (4) trees were located on private residential property. The total number of trees lost to DED from 1981 to 2020 inclusive (39 years) is **136**. Current thinking is that increase in incidences are correlated to the recent multi-year drought conditions.

Elm Tree Samples – Laboratory Results



Provincial Crop Protection Laboratory provides diagnostic services for tree disease identification. A total of 27 samples were submitted to the lab for DED confirmation during 2020. *Dothiorella ulmi* fungus appears similar to *Ophiostoma ulmi* (DED) fungus in situ and must be distinguished in a lab setting. *Dothiorella ulmi* is considered less aggressive than DED and is managed through a pruning and fungicide program.

DED Diseased Tree Locations

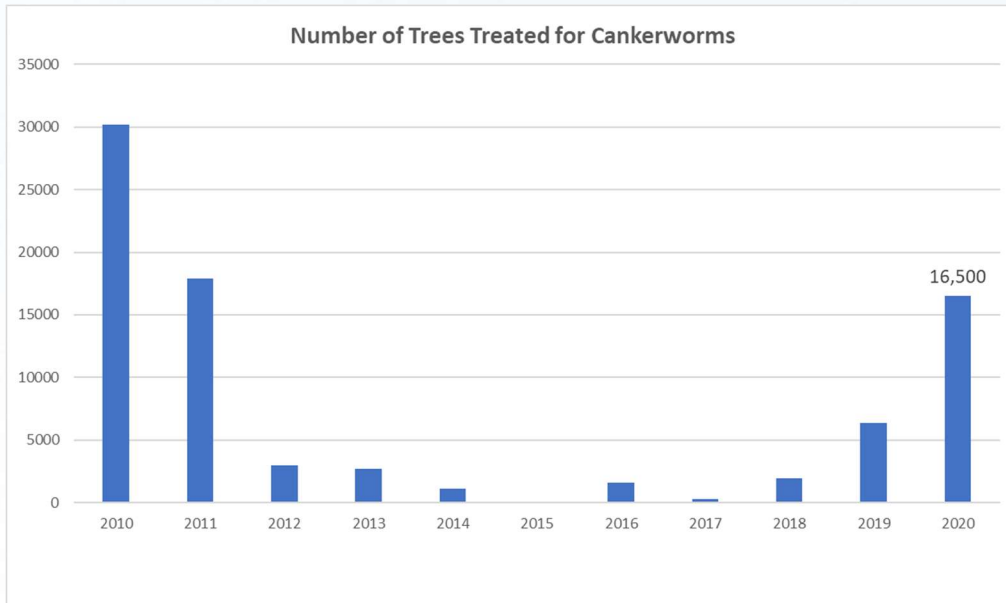


Locations shown are where elms were confirmed to have Dutch Elm Disease. Of the twelve (12) trees identified as having DED during the summer season, seven (7) infected trees located in Sector 4. All seven trees were within a two-block radius. This specific sector will have to be more frequently monitored in 2021.

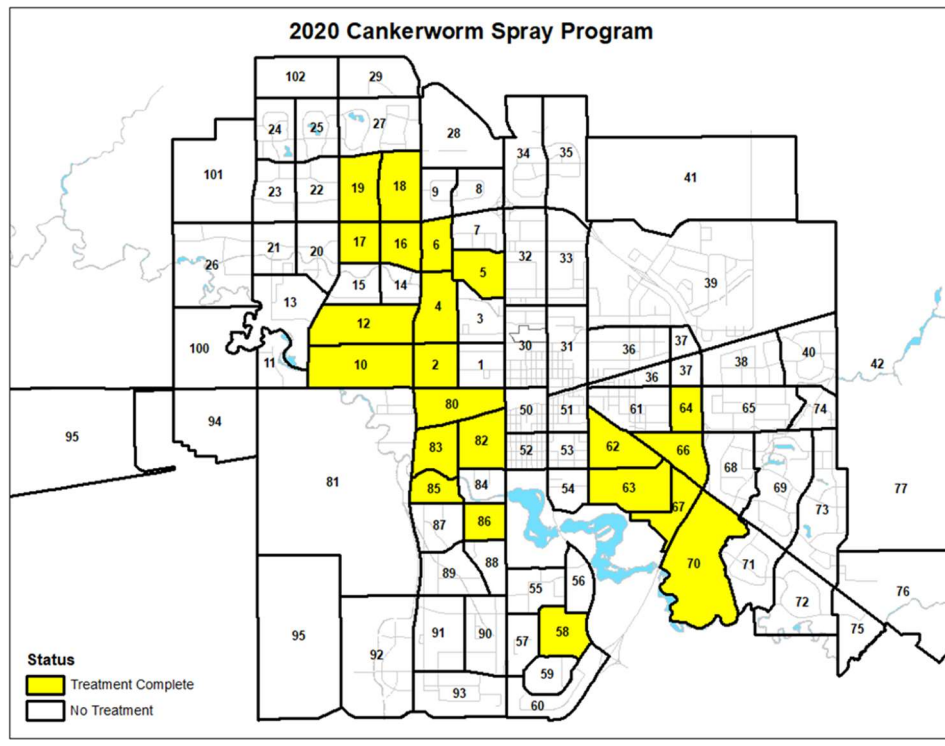
One tree was located at the Torr Hill Golf Course. This is technically in the provincial DED buffer outside of city limits. It is publicly accessible property owned by City of Regina. This identification of this tree and removal was completed by City of Regina crews.

Beyond the issue experienced in Sector 4 during 2020, the seemingly random presence indicates that the *Ophiostoma ulmi* fungus is endemic inside the urban forest. All trees shown on the map were removed within 48 hours of confirmation by the provincial laboratory.

Cankerworm Program

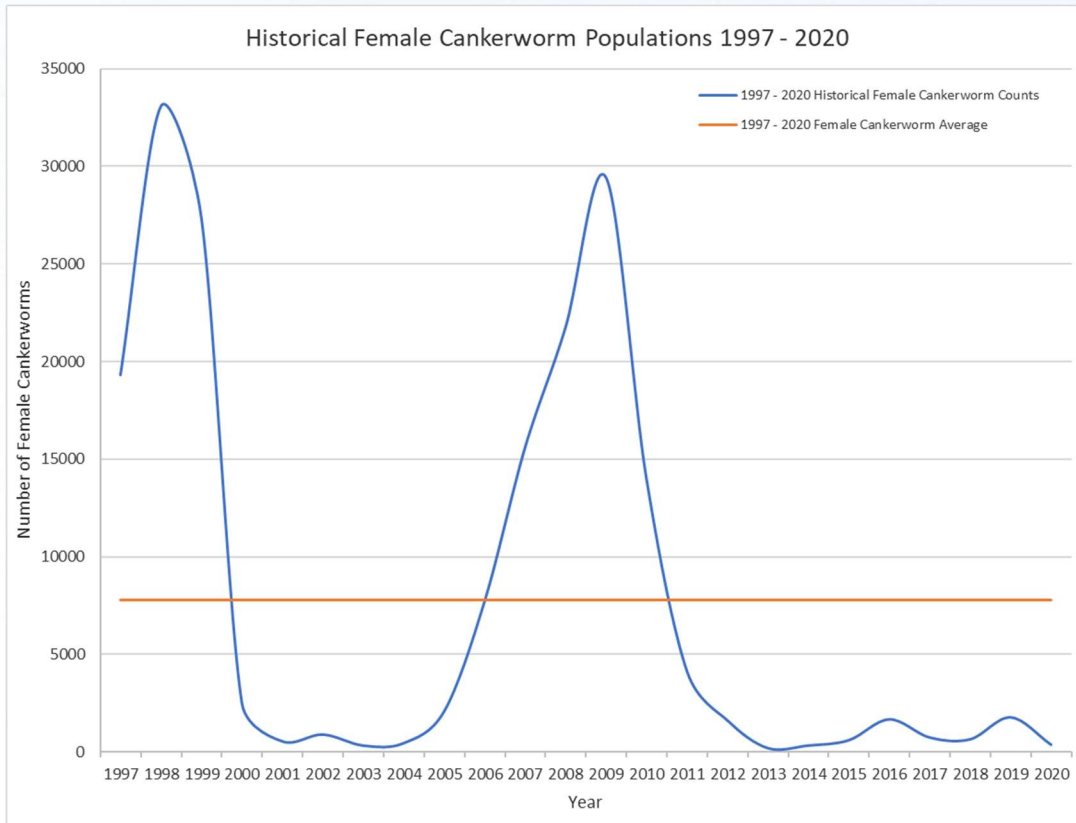


Total number of trees treated for cankerworm during 2020. Treatment was with a *Bacillus thuringiensis var. kurstaki* (BT) based spray. Historically treatments are based on populations exceeding established threshold.



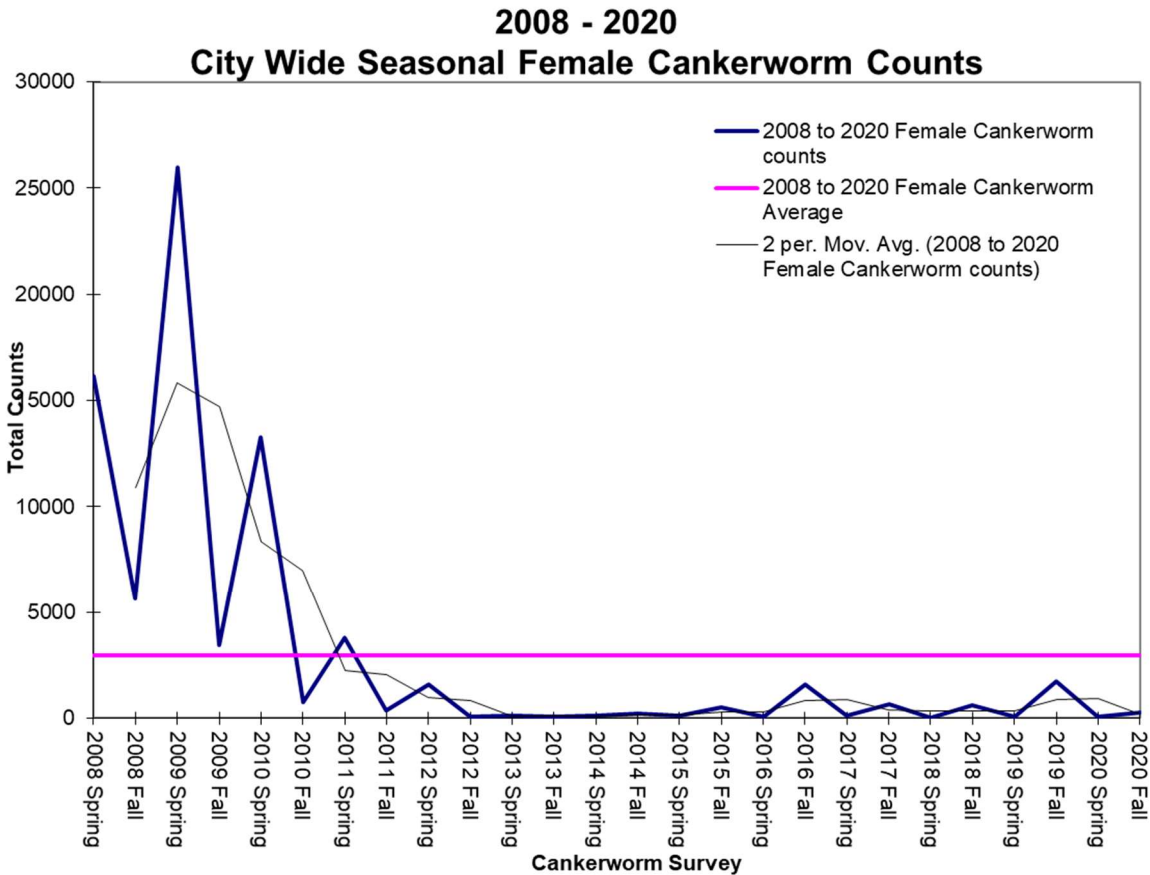
Sectors where treatments for cankerworms geographically occurred during 2020. In all, twenty-two (22) sectors were treated.

Cankerworm Trends - Populations looking forward



Cyclical nature of cankerworm populations since 1997. Each year is a total sum of female cankerworms of both spring cankerworm species (*Palecrista vernata*) and fall cankerworm (*Alsophila pomataria*). This does not truly represent defoliation cycle as fall cankerworm larval stage, straddles into the following year.

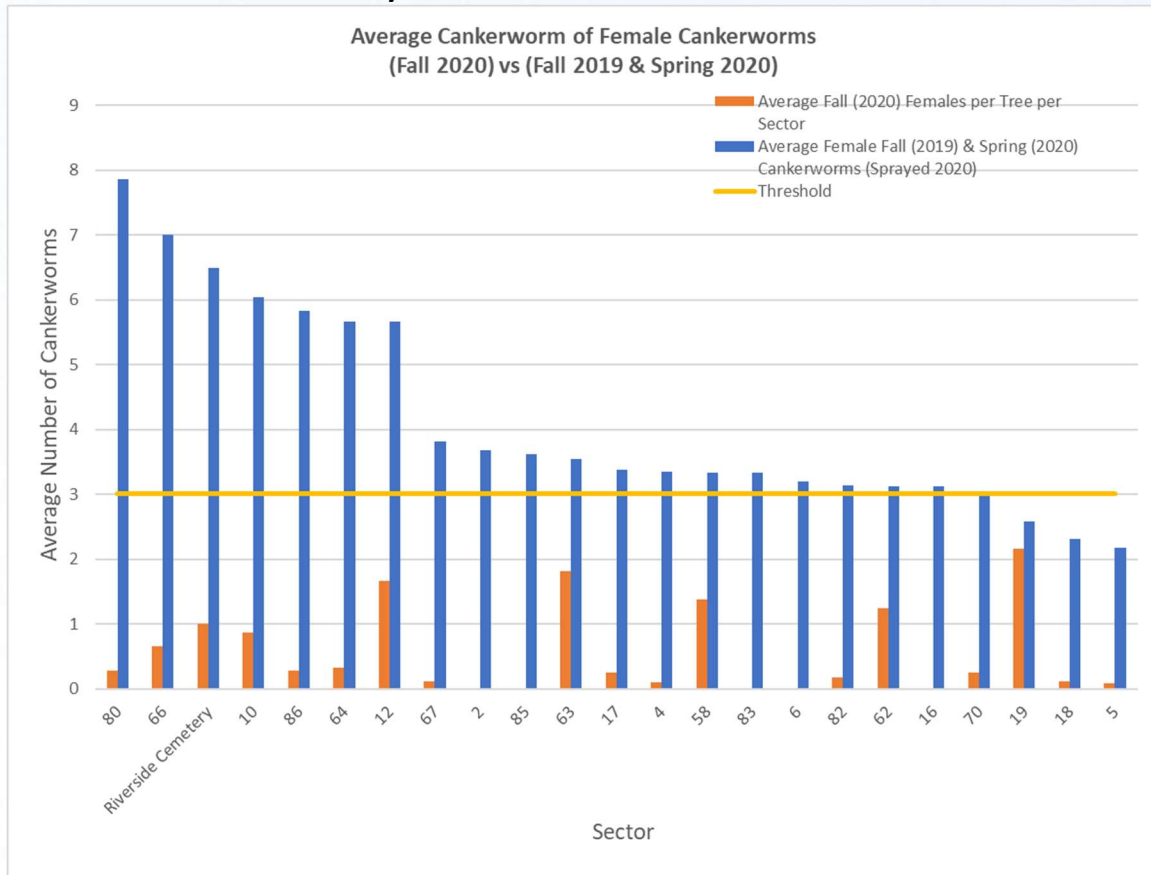
Cankerworm Trends - Populations looking forward (continued)



Historically, the driving population for defoliation event has been the spring cankerworm. This trend changed where the 2019 fall population was the driving population causing a need for the 2020 control program. The 2020 spring cankerworm population was virtually non-existent.

Looking towards 2021, the monitoring program indicates that the fall cankerworm appears to be minimal compared to the previous year's generation.

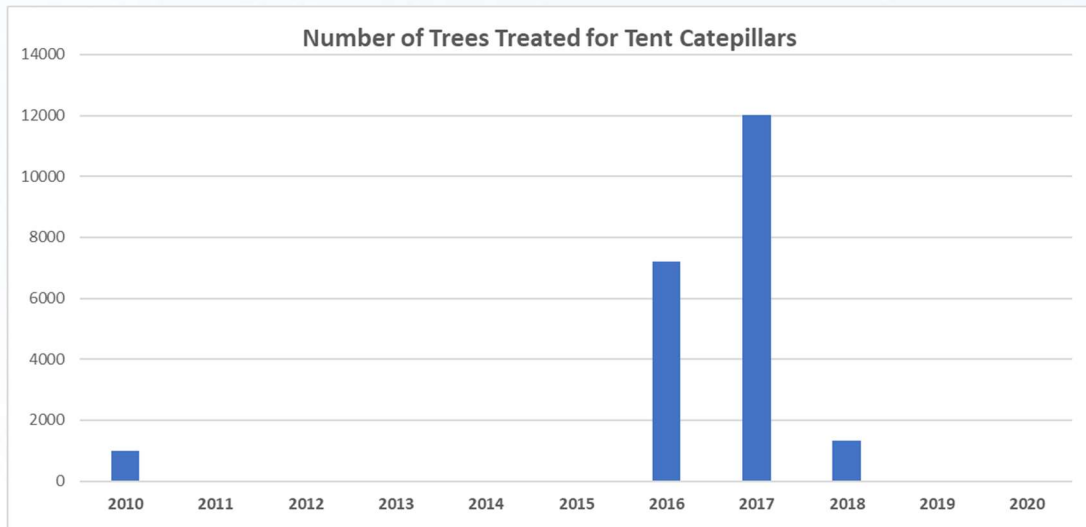
2020 Fall Cankerworm Survey



Of the 66 sectors surveyed during the fall of 2020, no sectors are currently identified as exceeding threshold (orange) for Fall Cankerworm (*A. pomataria*). Comparatively the 2019 fall and 2020 spring counts combined indicated that 20 sectors (blue) would require treatment.

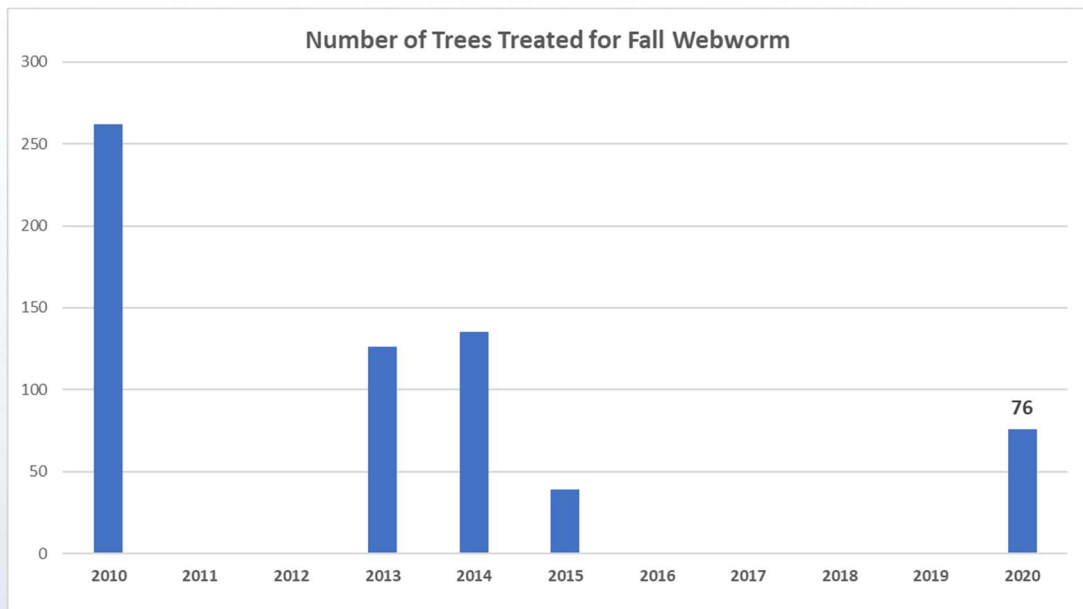
This may mean that treatment during 2021 may not be required. A final determination will be made once the 2021 spring cankerworm (*Palecrista vernata*) counts are completed in April of 2021.

Tent Caterpillar Program



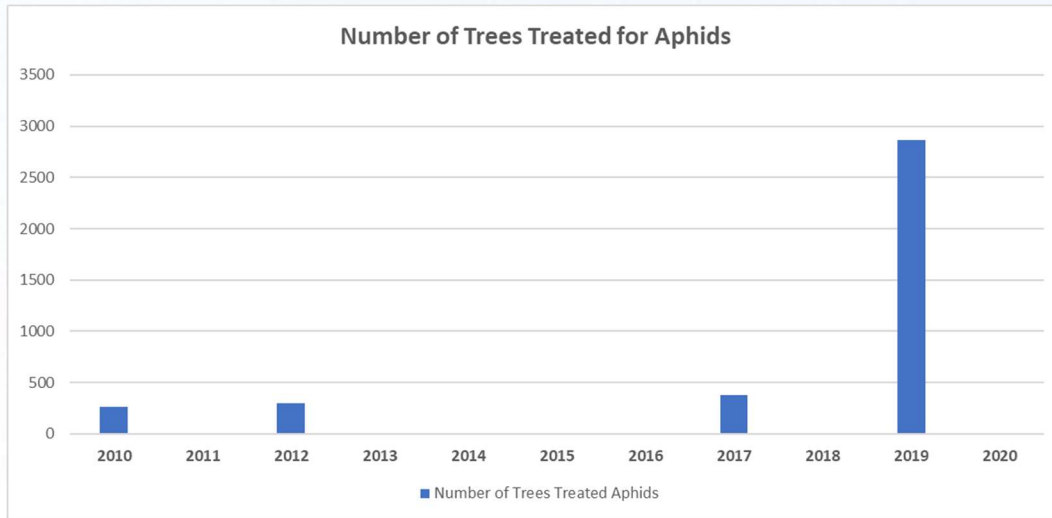
Fall monitoring during 2018, indicated tent caterpillar (*Malacosoma sp.*) would be below threshold. During 2020, no trees were required to be treated and no calls were received from residents regarding this insect. Branch sampling was not undertaken in the fall of 2020 for prediction of the 2021 larval population. Based on historical trend, it's thought populations will remain low for the next two to three seasons.

Fall Webworm Program



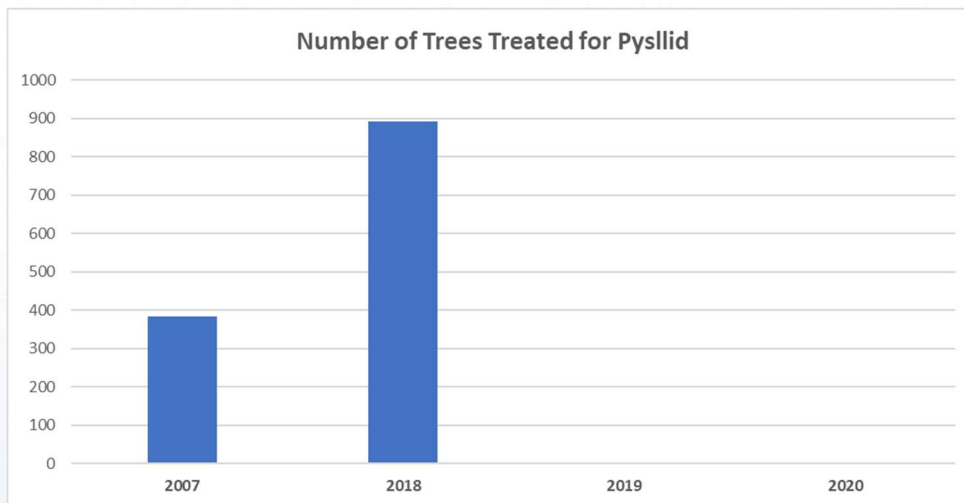
During 2020 a small control effort was made for control of fall webworm (*Hyphantria sp.*) Seventy-six (76) trees were treated, solely in response to service requests received. This was the first treatment program offered for fall webworm in 5 years.

Aphid Program



There were no aphid calls received for aphids (*Eriosoma sp.*) during 2020. Typically, this program is determined by volume of service requests received. When a call is received indicating a problem, the entire block is inspected and treated if required.

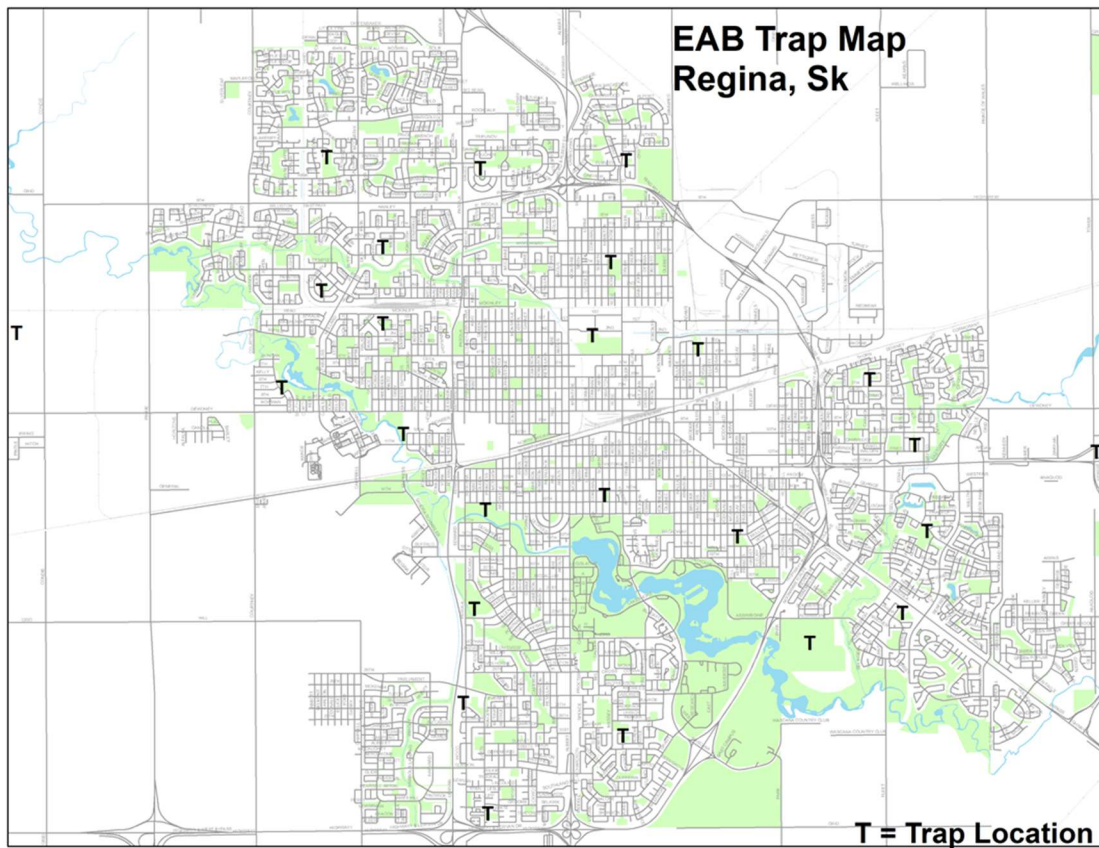
Cottony Psyllid affecting Ash trees



Cottony psyllid (*Psyllopsis discrepans*) primarily affects Black Ash trees (*Fraxinus nigra*). The insect made its first appearance in Regina during 2007. It then remained at an undetectable level until spring 2018. Following detection, Pest Control began treatments for the insect. During 2019, psyllid was almost undetectable, and no treatments were required. It is thought that the population had crashed due to below normal winter temperatures experienced in February 2019. During that month, eleven nights were well below -30°C with the coldest reaching -42°C .

Psyllid remained at an undetectable level during 2020.

Emerald Ash Borer Program

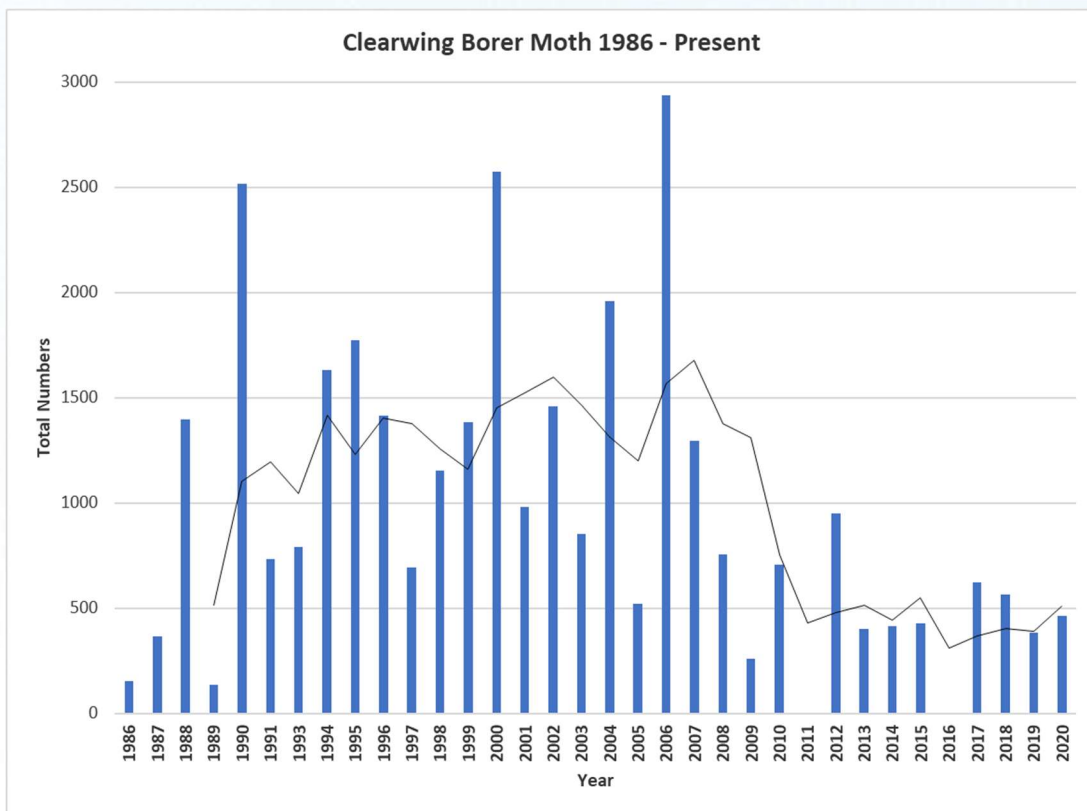


City of Regina operates 25 traps Emerald Ash Borer (EAB) traps within City limits. EAB has the potential to destroy 100% of all ash (*Fraxinus sp.*) within City of Regina. Trapping locations for early detection of Emerald Ash Borer during 2020 are highlighted. Trap locations have not been altered for the previous two years.

Results

- No EAB was detected during 2020;
- Closest known location for EAB: Winnipeg MB - first detected in 2017.

Clearwing Borer Moth affecting Ash Trees



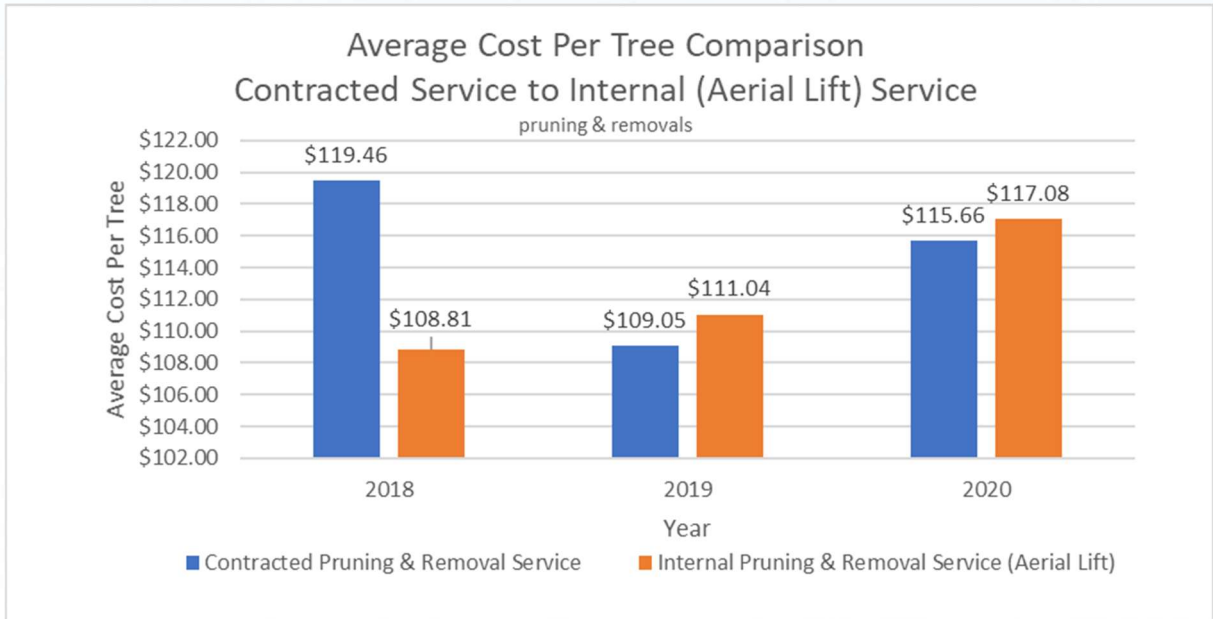
Clearwing borers (*Podosesia sp.*) affecting ash trees: 4-year trendline indicates population continues to remain at a low level. Clearwing borers affect the structural health of ash trees.

Current strategy for control is intensive pheromone trapping. Three hundred six (306) trapping locations were operated inside city limits - with two trap runs per location.

Outliers in data set include:

- 2011 – No trapping occurred
- 2016 – Incomplete dataset

City of Regina Strategic Outcomes
Community Outcome– Improve Service Financial Sustainability
Contractor vs Internal Service Delivery Comparison



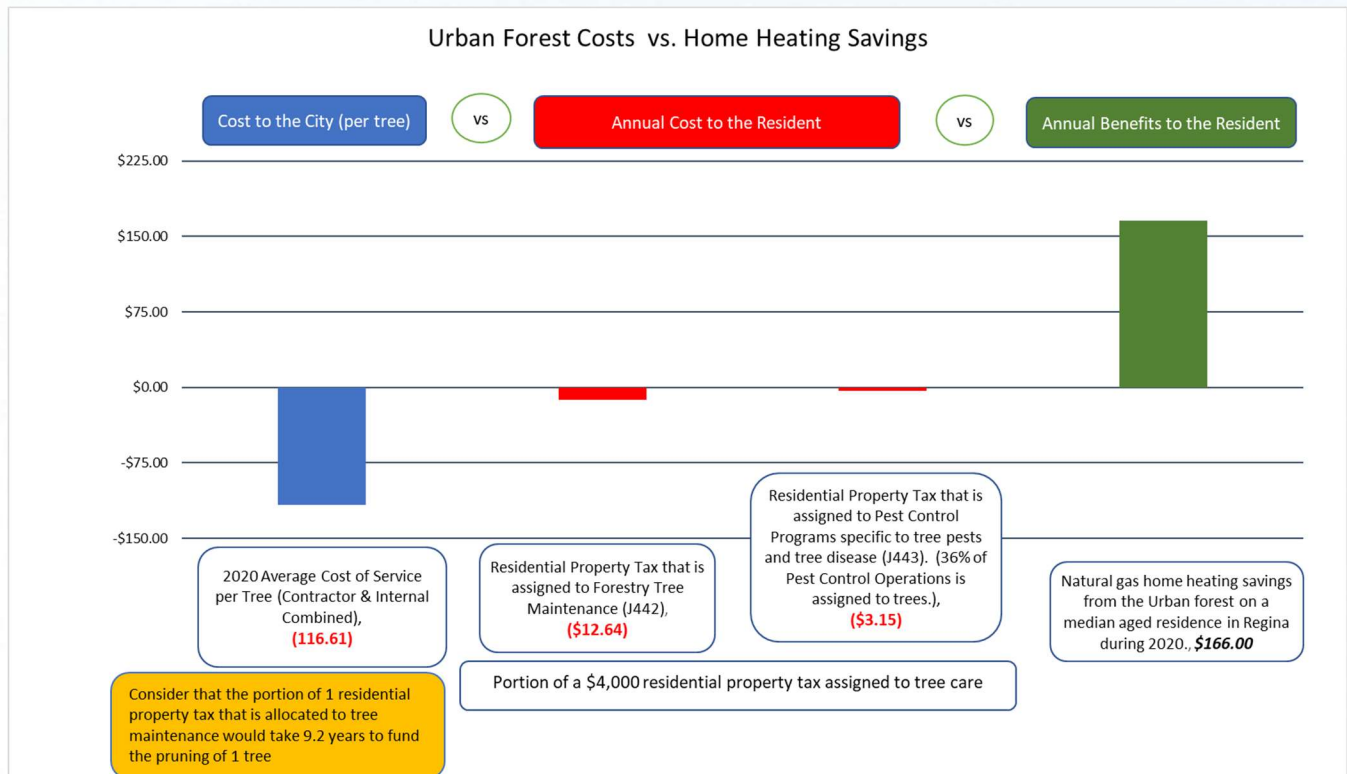
Contracted and internal services comparison for 2018 to 2020 inclusive. Internal services are only for costs reflective of trees requiring the use of aerial lifts.

Ground pruning costs are not included and are typically considered less expensive as trees are substantially smaller not requiring an aerial lift. Contracted services have not been utilized for any ground pruning during the time period measured.

There are number of factors affecting increase to pruning and removal costs for the current year. Typical factors for include:

- Overall size of tree, any obstructions/hazards encountered onsite, ease of access to the site.
- There were more removals during 2020 as compared to the previous year (883 trees removed during 2020 vs. 573 trees removed during 2019). As a broad statement, large trees requiring removal is more labour intensive than general pruning and does cost more. Most removals were completed by internal crews.

Community Outcome– Increase Understanding of Cost of Service Urban Forest Cost Benefit Comparisons



Average cost to prune one residential tree as compared to the amount that is allocated to the Forestry Maintenance (J442) budget. Pest Control budget (J443) that is specific to tree pests and diseases is shown as a comparison to Forestry Maintenance funding. The funding amounts illustrated are derived from a residence that paid \$4,000 property tax during 2020.

Costs are then compared to the benefits of an urban forest with mature trees in a prairie landscape for a residential single dwelling home built in the early to mid-1960's. For comparison purposes, costs are illustrated in the negative as compared to benefits. Information for home change of energy consumption savings in Regina is derived from National Research Council data provided to City of Regina during 2014 (≈22.5 GJ). The energy saved is then applied to 2020 SaskEnergy residential rates for natural gas consumption and delivery in cubic meters (\$117.76). Municipal delivery surcharge (\$5.89), federal carbon tax (\$36.46) and GST (\$7.04) are included within the total savings.

For natural gas cost savings derived from urban forest benefits, the only change from the previous year was an increase to the federal carbon tax (+\$13.33 or +57.6%). This increase in savings alone is slightly more than the entire forestry maintenance allocation (J442) that is sourced from residential property tax (\$12.64).

Financial Outcome – Increase Understanding Service Costs and Revenues Relative to Levels of Service

Plant Establishment Measures

Water Truck Only – Tree Waterings

Installed	Year Installed	#trees watered in system	Total waterings	Average	Frequency Schedule	June-October target waterings	% of target met
1st Year	2020*	202	1,634	8.1	once every 12 days out of 137 possible days June 1-Oct 15	11	73.54%
2nd Year	2019	1,090	6,092	5.6	once every 15 days out of 137 possible days June 1-Oct 15	9	62.10%
3rd Year	2018	445	1,212	2.7	once per month	5	54.47%

* 2020 only spring planted trees were tracked.

Water Truck combined with Rain Days – Total Tree Waterings

Installed	Year Installed	Average	Average plus 1 rain days	Frequency Schedule	June-October target waterings	% of target met including rain days
1st Year	2020	8.1	9.1	once every 12 days out of 137 possible days June 1-Oct 16	11	82.63%
2nd Year	2019	5.6	6.6	once every 15 days out of 137 possible days June 1-Oct 15	9	73.21%
3rd Year	2018	2.7	3.7	once per month	5	74.47%

One rain day recorded within app June 15th (14.2 mm precipitation evening of June 14th)

During 2020, Forestry and Geospatial Services collaborated to develop a tree watering application to track tree watering and developed a Key Performance Indicator (KPI) for scheduling. This was to ensure trees in unirrigated spaces were receiving enough water to establish in drought conditions.

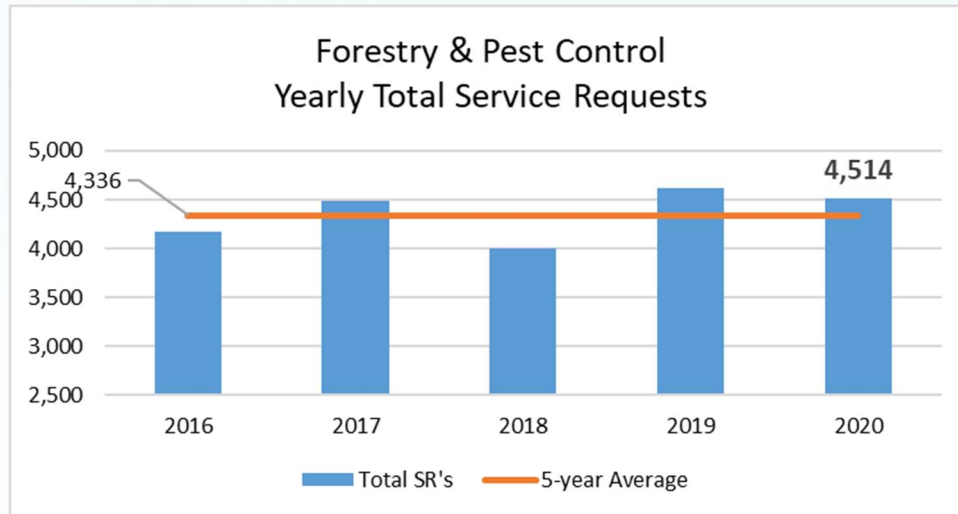
Once the app was developed it helped to schedule crews. It then tracked each individual tree watering and concurrently tracked the volume of water utilized during that time period. Within the scheduling portion of the app, first year trees were scheduled to be watered more frequently than second year trees; second year trees watered more frequently than third year trees. It is hoped that this will allow trees to acclimate to their surroundings.

By tracking costs, volume of water and tree watering frequency the following was determined:

- Average amount of water applied per tree during watering = **38 litres**
- Average cost to water one tree one time = **\$18.17**
- Average cost to establish one tree over three years **\$297**
- Accounting for one rain day - best KPI target achieved = **82.6%**

More work will be undertaken during 2021 to refine the KPI targets with a focus on increasing efficiency thereby reducing cost.

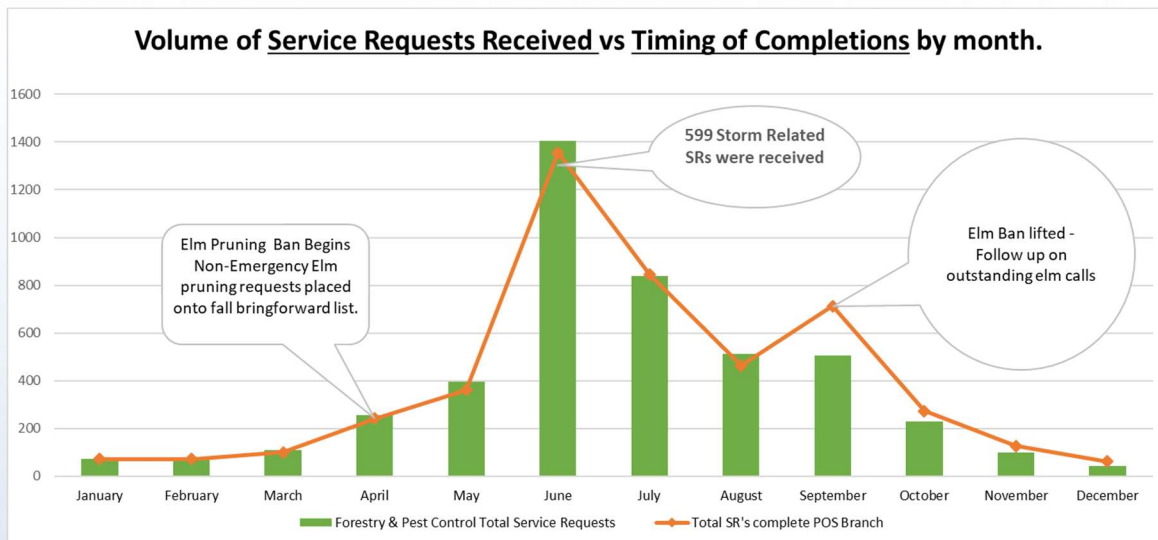
**Community Outcome – Deliver Reliable Service
Forestry and Pest Control Customer Service Measures**



For 2020: Forestry & Pest Control received 4,514 combined service requests (SR's). This was the second highest year of total service request received. The record year was 2019 where 4,618 requests were received.

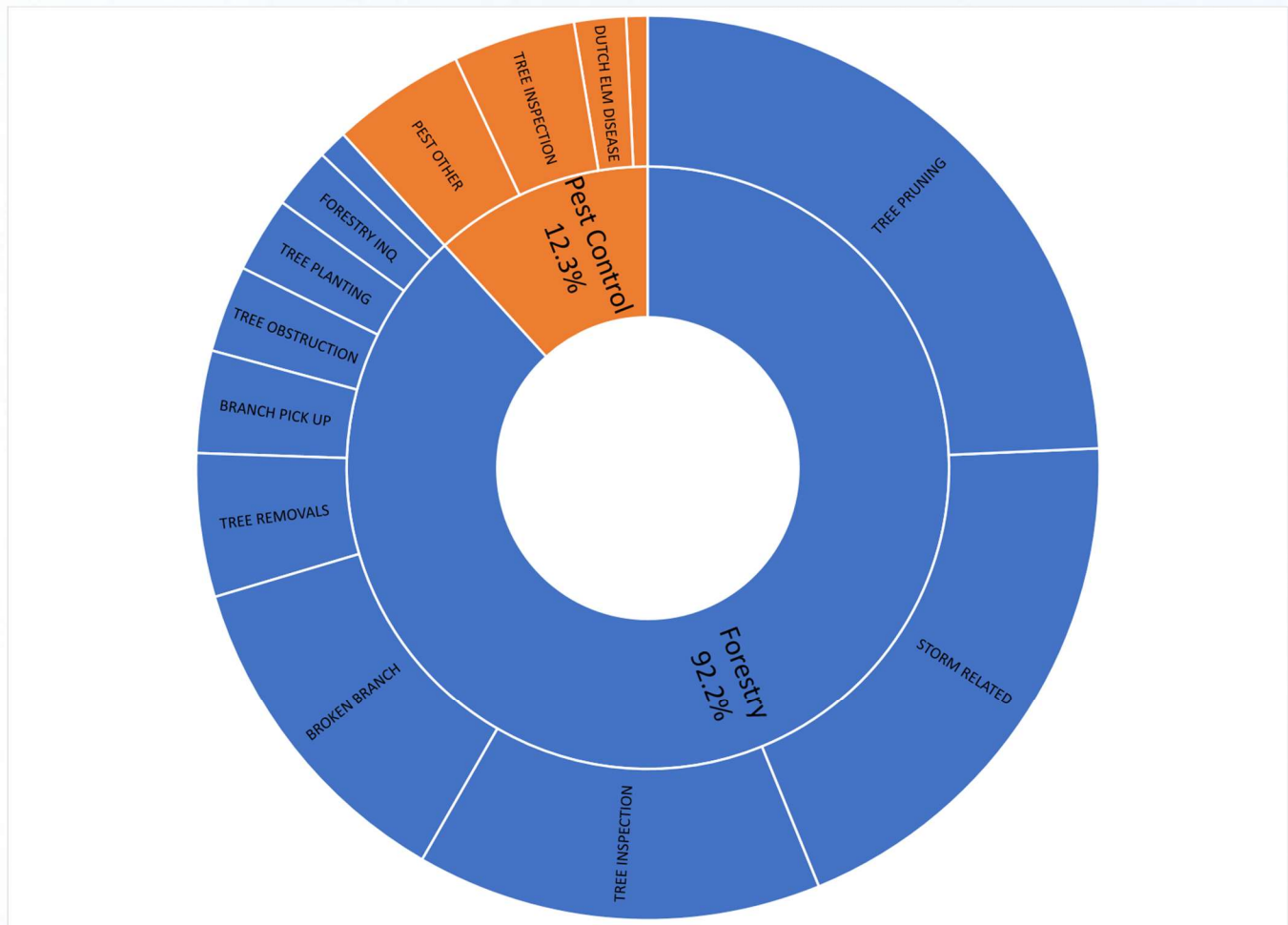
Of the 2020 SR's received, 806 (~18%) were directly related to summer storm damage service requests. The combined SR's received (4,514) represents 56% of all SR's received at the Parks, Recreation and Cultural Services Department level (8,002 SR's).

Completing requests throughout 2020



Non-emergency SR's for elm tree pruning received from April to August inclusive are deliberately delayed for response due to provincial DED regulation. To meet customer service expectations, there is a deliberate focus on responding to the backlog for these requests during September and October.

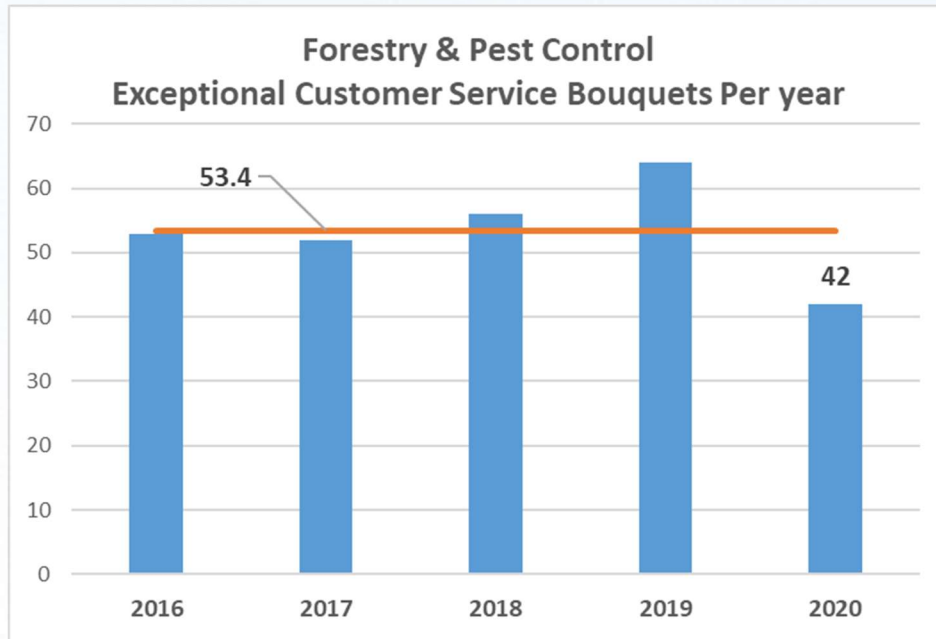
Urban Forest Service Requests by type



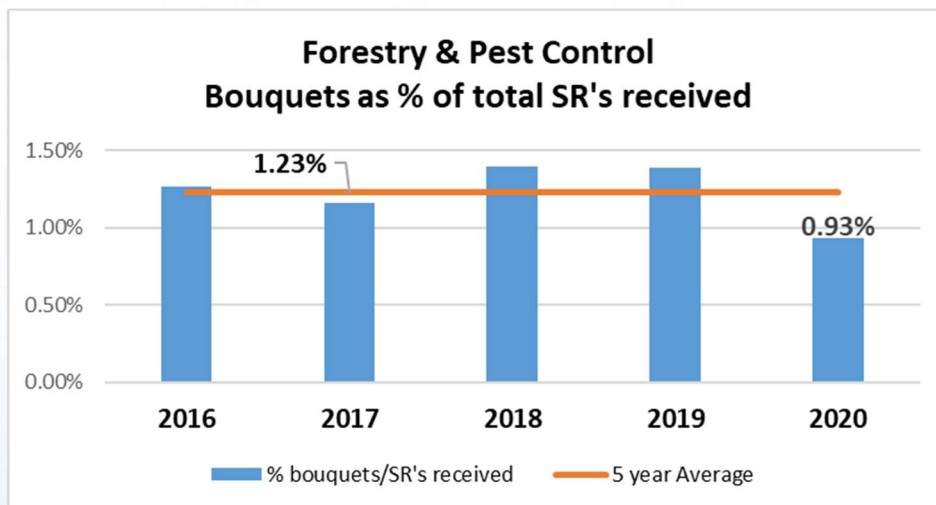
Pie distribution representing the percentage of tree related service requests for 2020.

Other tree pests – Is often a catch all of calls from residents regarding fall web worm, aphids or cankerworms. It should be noted that cankerworms also have their own category but sometimes this cannot be distinguished easily at the Service Regina level as residents may not clearly identify the difference with the insects and trees affected.

Exceptional Customer Service Bouquets



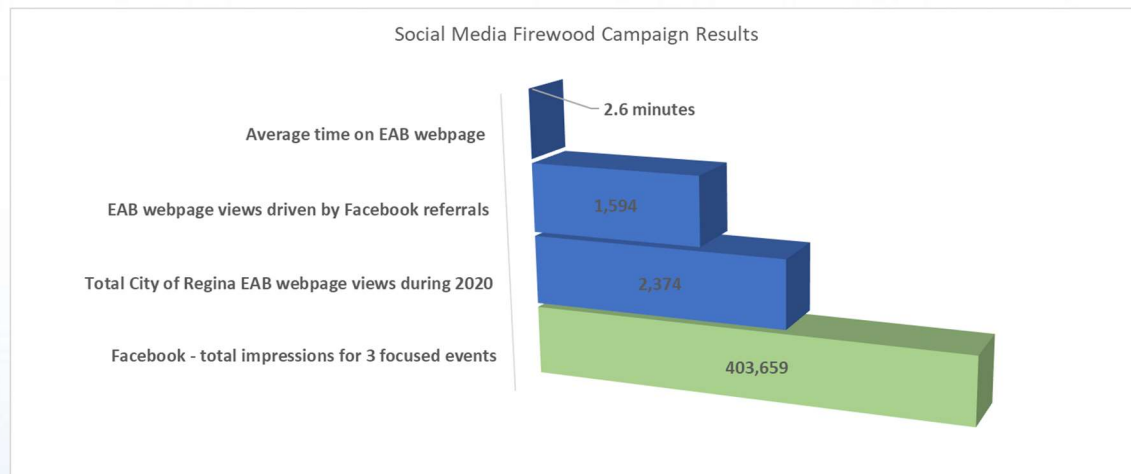
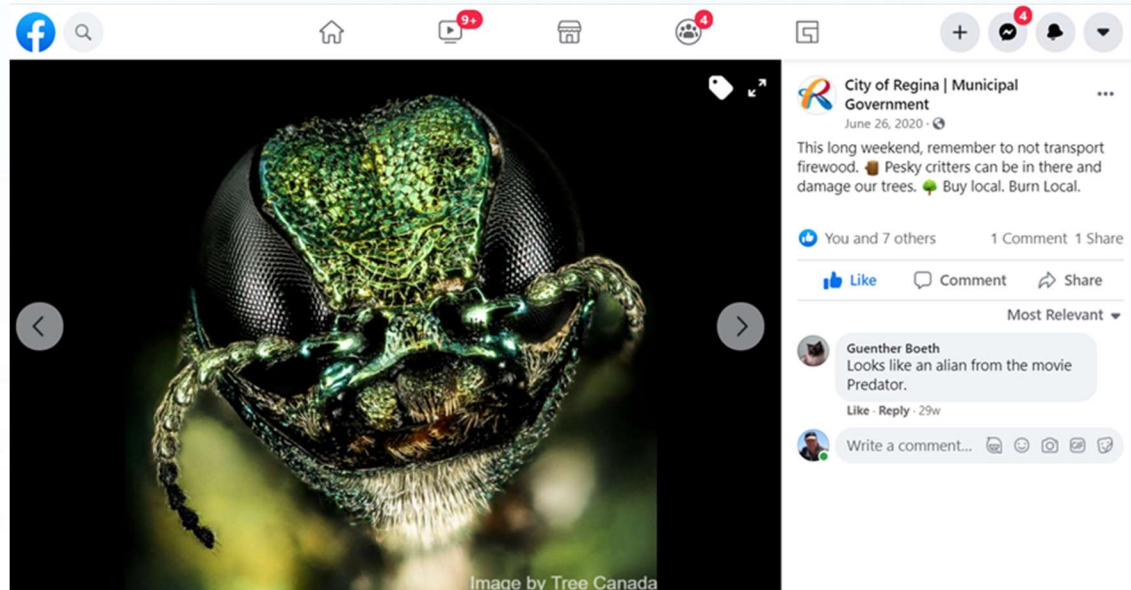
Exceptional Customer Service Bouquets received are considered indicative of customer service delivered to the community.



For every 100 Service Requests received during 2020, Forestry and Pest Control received 0.93 Exceptional Customer Service Bouquets. This is a benchmark measure the forestry and pest control group has created and is utilizing to ensure good customer service.

Staffing levels were reduced by 30% due to Covid-19 pandemic. With staffing limitations in place, pruning for “tree beatification only” service requests were not taken at the Service Regina level. Our assumption is that Covid impacted bouquets negatively. Correspondingly the ratio of customer service satisfaction was 0.3% below the 5-year average.

Internal Process Outcome – Improve Internal and External Communication Citizen Experience Department Statistics - Forestry and Pest Control Programming



Social Media Firewood Campaign – Invasive species affecting trees. The media campaign used an image of the Emerald Ash Borer (EAB). This was a summer long focused social media campaign targeting campers and cottagers, asking them not to bring firewood back to the city. The campaign was targeted around three long weekends of summer for a total cost of \$1,500. It also had an organic release to the public on June 26th.

The Social Media Firewood Campaign increase total views of the City’s EAB web page by slightly more than 1,600% as compared to the previous year. (2020 = 2,374 vs 2019= 137)

Mission – We are dedicated to building a strong community by providing reliable, sustainable services.

Notable 2020 Events



September 19, 2020
Sikh Community – Guru Nanak Tree Planting and Dedication Event



September 24, 2020 - National Tree Day
300 Trembling Aspen whips were freely distributed at the outdoor Regina Farmers Market.

END