City of Ogdensburg

Executive Summary

- A total of 2,507 trees make up the collective shade tree population of the City of Ogdensburg. There are 6,552 potential planting sites located on the city right of way; this does not include sites available within the parks located throughout the City.

- Nearly 50% of the collective population is composed of the maple family; this is 20% over the recommended percentage for any given family. The rest of the population is composed of a variety of species that compose of less than 10% for the collective.

- While many different size classes are represented across the collective tree population, over 26% are in the 0 to 6 inch diameter class; it is recommended there be 40% in this diameter class. There are very few large diameter trees, with 24% measuring over 19 inches in diameter, it is recommended 30% be in this diameter class.

- Co-dominant stems and dead crown wood were the most common structural defect observed on approximately 82% and 65% of all trees respectively. These defects can lead to structural weakness long-term or pose hazards, but are easily addressed for most trees through regular pruning and maintenance.

- Manmade cultural damage is common in most shade tree populations; typically lawnmowers and weed trimmers are the most common source of this damage. Nearly 40% of all trees in the collective population showed signs of this kind of damage. Repeated exposure to this kind of damage can pose a significant threat to tree health over the long-term.

- As a whole the trees in the collective population are of excellent health and condition. Eighty six percent of the trees were given the highest condition rating possible, while less than 3% were found in poor condition.

- The collective tree population represents a significant amount of value. In terms of what it would cost to replace this population, the value of all trees collectively is appraised at over $11.3 million.

- Shade trees contribute directly in the reduction of green house gas. It was determined the collective tree population is storing nearly 9.5 million pounds of carbon and sequestering nearly 444,563 lbs of atmospheric carbon dioxide annually.

- Trees play an important role in the uptake, storage, and interception of rainwater, and it was determined that the collective tree population is responsible for intercepting and deferring over 3.4 million gallons of water annually.

- Trees help improve air quality through the interception and absorption of pollutants. It was determined that the collective tree population across all three campuses is responsible for the direct reduction of nearly 2,140 lbs of pollution emissions on annual basis.

Species Composition

The profession of arboriculture recommends that an urban tree population should contain no more than 10 percent of one species, 20 percent of one genus, or 30 percent of one family. For example, for every 100 trees planted, care should be taken that no more than 10 of those trees are of a specific species, such as red maple, and no more than 30 of those trees should be from the maple family. Within this standard we are primarily concerned with maintaining genus and family at these levels; species becomes more of an issue when dealing with some of the more exotic species and cultivars. This standard was established because maintaining a diversity of tree species helps contain risk associated with host-specific insects or disease, where only a portion of a population will be threatened if a problem becomes an epidemic. A diverse mixture of species can help reduce both the spread of tree disease or insects and the impacts they have on the overall tree cover. There have been many examples throughout history where an insect or disease (i.e. Dutch Elm disease, Gypsy Moth, Emerald Ash borer) has had wide spread devastating impacts to specific tree species, emphasizing the importance of diversity.

Diversity also allows a tree population to make an aesthetic contribution to the landscape. Trees can be utilized to beautify a community at strategic times of year; trees that flower in the spring can provide a colorful backdrop to the community, while trees that have a dramatic color change in the fall can be aesthetically pleasing during the fall.

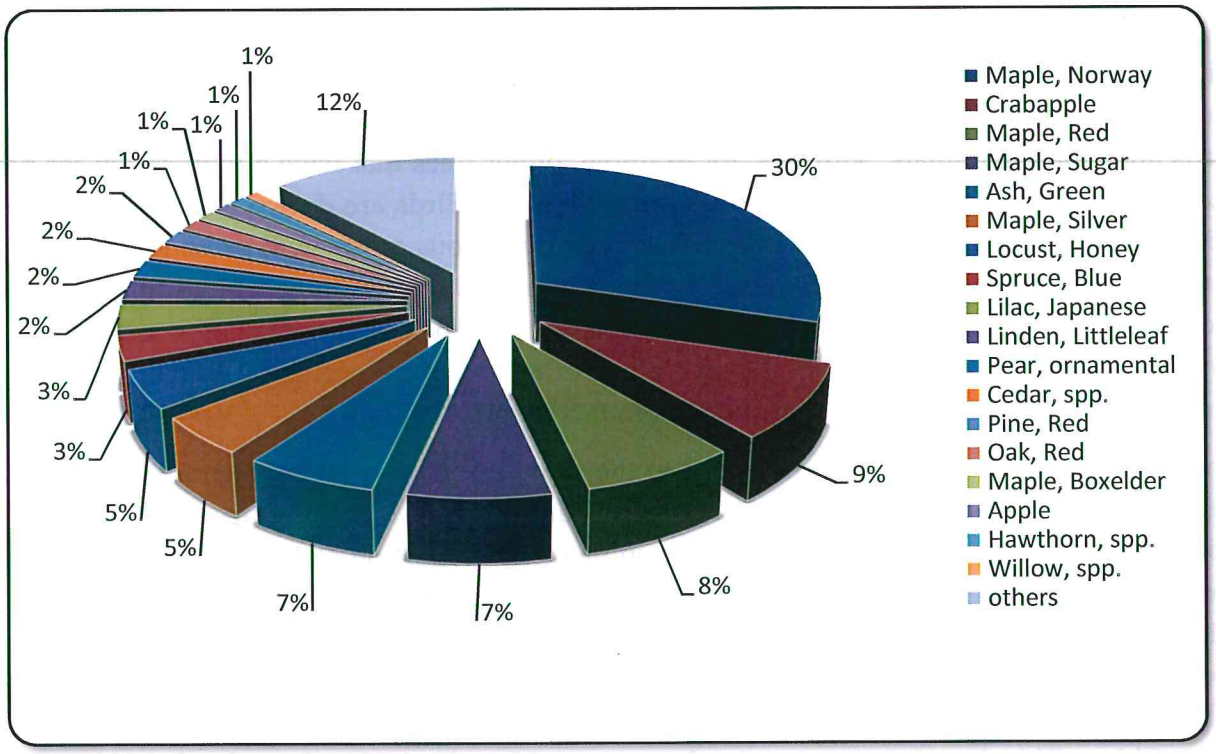
Diversity in species and crown class can also play a role in meeting wildlife habitat needs and increasing ecological benefits. Variation in canopy provides cover and food for many different birds and small mammals. Squirrels, for example, prefer trees that have a high crown for nest building, but also need acorns and pinecones for a food. Birds are drawn to trees and shrubs with berries or fruit on them. A tree with a large deciduous crown will provide more shade during the summer and in effect reducing the cooling costs for a home. In addition a larger crown and diameter tree will aid in stormwater retention and filtration as compared to a smaller canopy and diameter tree. These are two examples of the ecological benefits of the tree canopy, more will be discussed in detail later in this report.

The chart below illustrates that compared to the standard there is an imbalance to the current tree population. Maples exceed the standard for family by 20%, making up about 50% of the population; all others are lower than the recommended proportion of 10%. When the species composition of a tree population is imbalanced and heavy to any one family group like it is with the maple family in Ogdensburg, the risk of large scale impact from aggressive host specific insects or disease is dramatically increased. The maple family in particular is threatened in several parts of the eastern United States by the Asian long horned beetle, an invasive species from China. This insect is present in down state New York, but has also been found in Massachusetts, New Jersey, and Ohio. While the maple family is favored by the Asian long horned beetle, it also impacts elm, birch, horse chestnut, poplar, willow and ash. Adult beetles lay their eggs under the bark of the host trees, and after hatching, the larvae bore deep into the trees eventually killing them. The beetle was introduced into the infested areas presumably by

solid wood packing material, which accompanies commodities moving into the United States. There is added risk to the City of Ogdensburg due to its location along a major shipping route of the St. Lawrence Seaway. If the beetle should be introduced it could be detrimental to the maple family of trees and to Cities Urban tree canopy. Not only could this result in a significant a financial burden for the City to remove and replace those trees impacted by the beetle, but the City's aesthetic qualities associated with the trees would be altered. Early detection of insects and diseases through regular monitoring, together with reducing the proportion of trees in the maple family along the City managed right of way is the first line of defense in minimizing their impacts on the urban forest.

Although most species populations exist well below the standard proportion of 10%, care should be taken to make sure that as additional trees of the same existing species are planted, they are not allowed to exceed this standard. The City is encouraged to continue planting a wide variety of species throughout the City. With the introduction of new species and the expansion of the existing population, species composition should be relatively easy to maintain at recommended levels.

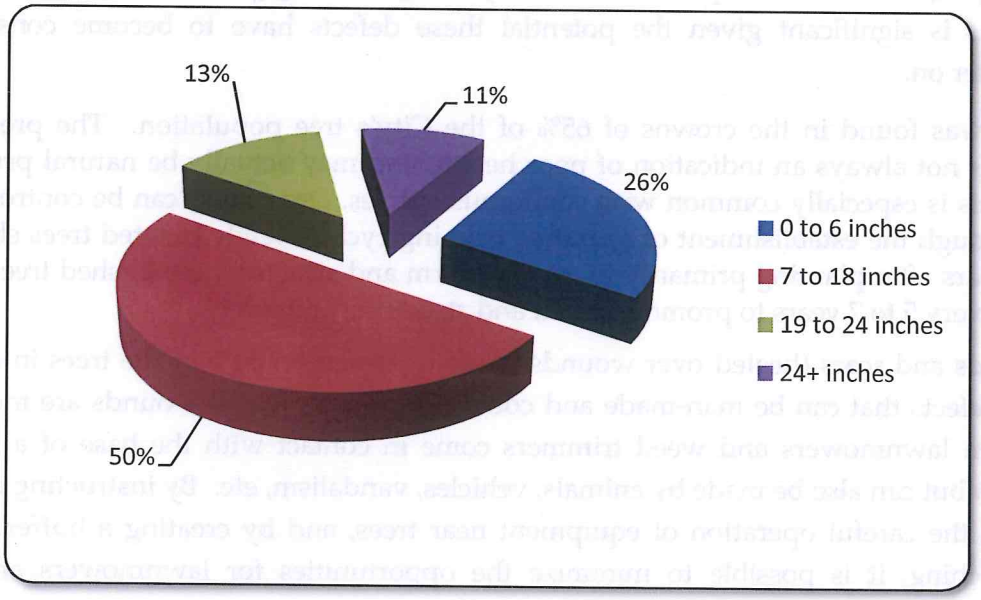
A full listing of all the tree species found in the City is listed in the City of Ogdensburg Tree Site Information section.



Diameter Distribution

The profession of arboriculture recommends that the diameter class distribution of a tree population follow a 40-30-20-10 rule (40% small/young trees 0"-6"; 30% established trees 7"-18"; 20% mature trees 19"-24"; and 10% very old trees >24"). Large trees can be more costly to maintain, however they do provide greater benefits, like oxygen production, air cleaning, reducing storm water runoff, etc. The chart below clearly illustrates that the existing tree population is not consistent with this standard. The population is over-stocked with the established trees (7-18" dbh), under stocked with small/young trees (0-6" dbh), and under-stocked with mature (19-24") size classes. It is expected that the number of the trees in both the established and mature size class will continue to increase in time as trees mature, while the 0-6 inch size class will increase as new trees are continually planted. Overtime the percentage of trees found within each size class is predicted to become more in line with the recommendation as new trees are planted (providing some of the species planted are capable of growing to larger sizes). Even as the population falls in line with the standard distribution overtime, the City should budget for the increase in cost of caring for the maturing tree population. Currently there are 1,858 trees greater than 7 inches in diameter at breast height – the majority are in the maple family; they will continue to grow in size and will require increased maintenance as they mature.

For the short term, the City may want to focus on balancing the planting of trees that have the ability to grow into the larger sizes with trees that will remain in small diameter size. At the next update to this plan, the diameter distribution can be re-evaluated and new recommendations can be made for future plantings.



Structural Defects

Structural defects are points of existing or potential weakness in trees; these may be naturally occurring or may be the result of manmade cultural damage that has progressed to a point of potential weakness. Structural defects can be categorized as decayed wood, cracks, root problems, weak branch joins, cankers, poor tree form, or dead top/branches.

Co-dominant stems and dead wood found within the crown are the most prominent structural defects found in the City of Ogdensburg (see also the chart below). Co-dominant stems are where there are two or more main leaders of similar size arising from the same point in the crown of the tree. Co-dominant stems and narrow "V" shaped crotches often are weakly attached. These attachments often result in included bark as well. Included bark is bark that has become embedded between opposing branches, a branch and a main stem, or two co-dominant stems creating a structurally weak point in the tree. Weak branch joins and joints with included bark are the points at which failure can occur when the tree is under stress from high winds, snow or ice. These weak points are easily detected when the tree is young and is the best time to correct them. Branches that exhibit these defects should be eliminated as soon as they are discovered. As these branches continue to enlarge in diameter and weight, the tree is more likely to split at this weak point, and as trees mature it is more difficult and costly to remove, and may be too damaging to the tree to remove a potentially large part of the crown.

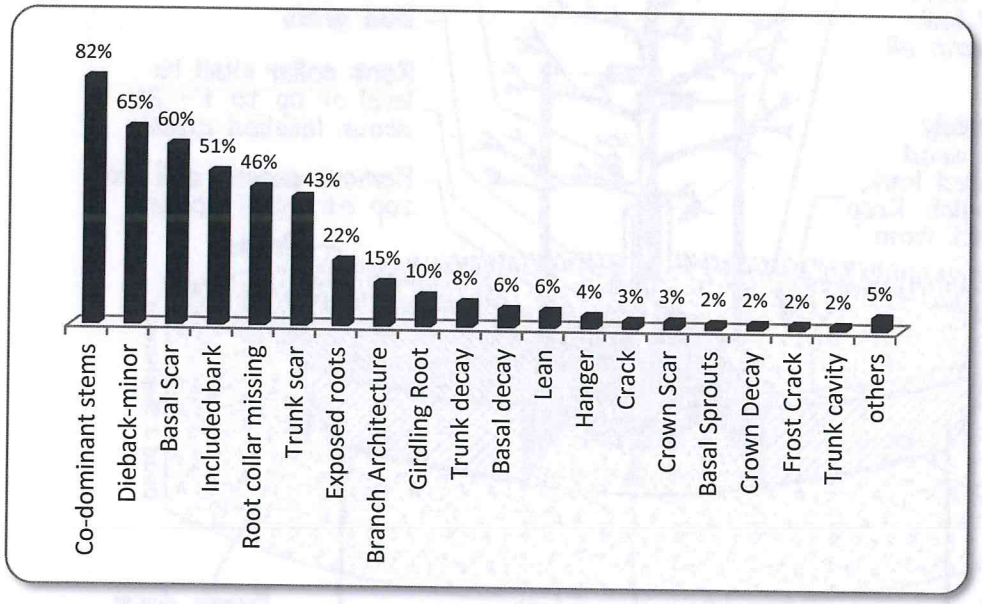
Over 80% of the trees in the City have co-dominant stems; of those, many also have included bark. It is not uncommon for trees in the maple family to have co-dominant stems (especially Norway maple); this is not unexpected for the City of Ogdensburg given the high population of maples. This is significant given the potential these defects have to become considerable problems later on.

Deadwood was found in the crowns of 65% of the City's tree population. The presence of deadwood is not always an indication of poor health, and may actually be natural pruning of branches; this is especially common with coniferous species. Deadwood can be controlled and reduced through the establishment of a routine pruning cycle. Newly planted trees should be pruned 7 years after planting primarily to manage form and structure; established trees should be pruned every 5 to 7 years to promote health and structure, and safety.

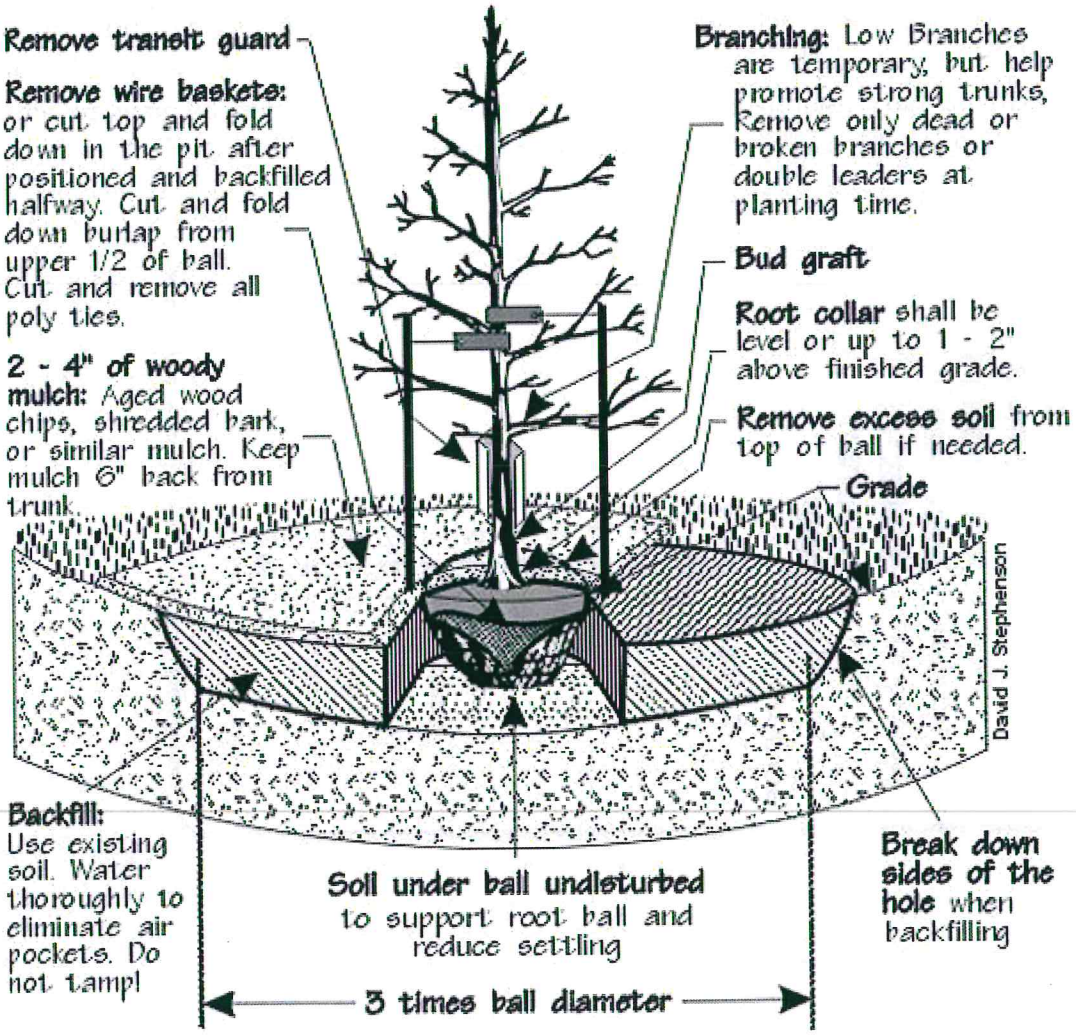
Basal wounds and scars (healed over wounds) were observed on 60% of the trees in the City. These are defects that can be man-made and could be avoided. Basal wounds are most often caused when lawnmowers and weed trimmers come in contact with the base of a tree and remove bark but can also be made by animals, vehicles, vandalism, etc. By instructing residents and staff in the careful operation of equipment near trees, and by creating a buffer through proper mulching, it is possible to minimize the opportunities for lawnmowers and weed trimmers to come into contact with trees.

A missing root collar was very prevalent throughout the City, both on trees planted in the Right of Way and in parks – this is the direct result of trees being improperly planted too deep. When a tree is planted the root flare or root collar should be above the soil line. The root collar was

below the soil line for the City trees observed with this defect. When buried too deeply, tree roots decline in health and condition. Poor tree health results in reduced growth rate, atypical leaf size and color, increased disease susceptibility, and reduced cold hardiness. Trees in poor condition exhibit decay, cracks, and excessive deadwood. Sometimes trees show signs of stress within the first year of planting, but it usually takes several years. This defect is difficult to correct with already established trees, but can be prevented with all new plantings. The diagram following this section illustrates proper planting.



Proper Tree Planting Diagram



Stake only if you have to. Use 3"-wide webbing straps and secure to stakes with heavy gauge wire. The wire should be able to stick straight out from the stake and hold the webbing strap up, preventing it from sliding down the tree. Do not stake tightly - trees gain strength from movement. Remove all stakes after one year.

Use of tree wrap is not recommended, as it causes a number of problems for the tree.

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Urban and Community Forestry
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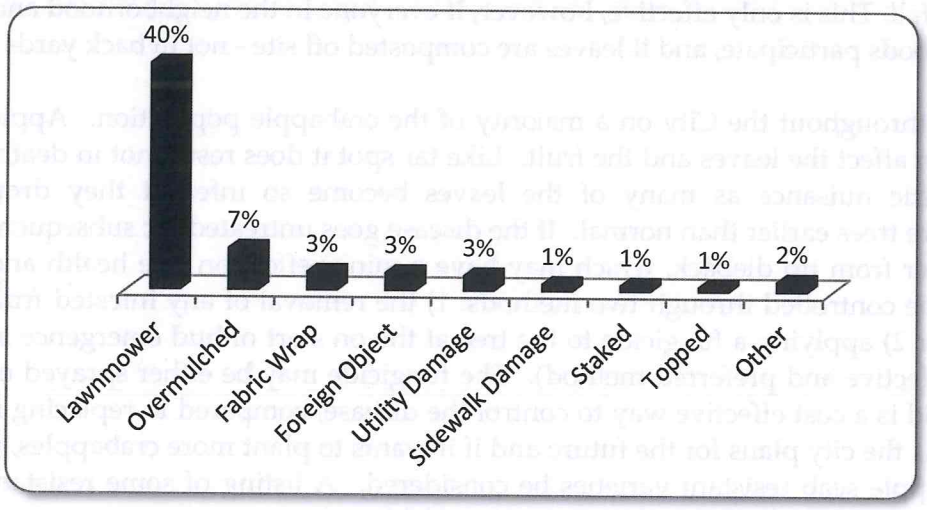
[1] http://www.treeboard.org/tree_diagram.aspx

Cultural Damage

Cultural damage is any damage that results from the activities or actions of people. Under many circumstances and depending on the extent of the damage, cultural damage has the potential to develop into a structural defect.

Out of the 2,507 trees in the City right of way, 991 (40%) have been damaged by lawnmowers and weed trimmers (see also chart below). This includes any wounds to the base of the tree or the roots. This type of damage can open the tree up to insect infestation and disease infection at the site of the wound allowing them to worsen. Damage of this nature can be prevented through proper mulching around the base of the tree and with operator care.



Disease

The presence of tree disease and insects were prevalent on some tree species and limited on others. At the time of the inventory, 776 trees (31%) showed signs of disease; of these, 517 trees were found to have tar spot and 112 trees had apple scab.

Tar spot was found infecting a large percentage of the Norway maple; it is fairly common to the species. Tar spot is a fungal disease found on the leaves in the shape of black spots which can be as large as a quarter. The disease is spread by fallen leaves bearing the tar spots that overwinter; with the onset of warmer weather in spring, the black spots begin to produce spores internally. After extended rainfall or prolonged wetting, the spores are carried by wind to newly expanded maple leaves and the cycle begins anew. Tar spot has more of a cosmetic impact with no real impact to tree health, and is not a cause of decline or death. Controlling tar spot can be accomplished by collecting and removing as many of the fallen leaves bearing tar spots as possible in the fall. This is only effective, however, if everyone in the neighborhood and surrounding neighborhoods participate, and if leaves are composted off site - not in back yards.

Apple scab was found throughout the City on a majority of the crabapple population. Apple scab is a fungus and can affect the leaves and the fruit. Like tar spot it does result not in death; it is more of a cosmetic nuisance as many of the leaves become so infected they drop prematurely leaving bare trees earlier than normal. If the disease goes untreated for subsequent years the tree may suffer from tip dieback, which may have a minor effect on tree health and form. Apple scab can be controlled through two methods: 1) the removal of any infested fruit and leaves in the fall, or 2) applying a fungicide to the tree at the on start of bud emergence in the spring (the more effective and preferred method). The fungicide may be either sprayed or injected into the tree and is a cost effective way to control the disease, compared to replacing it for aesthetic reasons. As the city plans for the future and if it wants to plant more crabapples, it is recommended that apple scab resistant varieties be considered. A listing of some resistant varieties is found in the Recommended Tree Species section of this report.

Fruiting bodies (mushrooms, shelf fungi) or cankers (dead or discolored sections of bark and wood) are signs of fungus and often indicate that there is some form of decay within a tree, the extent of which is not always apparent without a more thorough inspection. There were 24 trees found to have some form of a conk or fungus. This decay associated with these fruiting bodies can seriously impair the structural integrity of the trees they infect, and in advanced cases result in total tree failure, often with little warning. It is important to note that mushrooms and shelf fungi are seasonal and depending on their life cycle are only visible at specific times of year; as such it is possible that fungi are present in more trees than those recorded, because their fruiting bodies were not present during the site visit. In the years subsequent to the inventory, if mushrooms or shelf fungi are observed on other trees they should be noted and those trees should be monitored more closely.

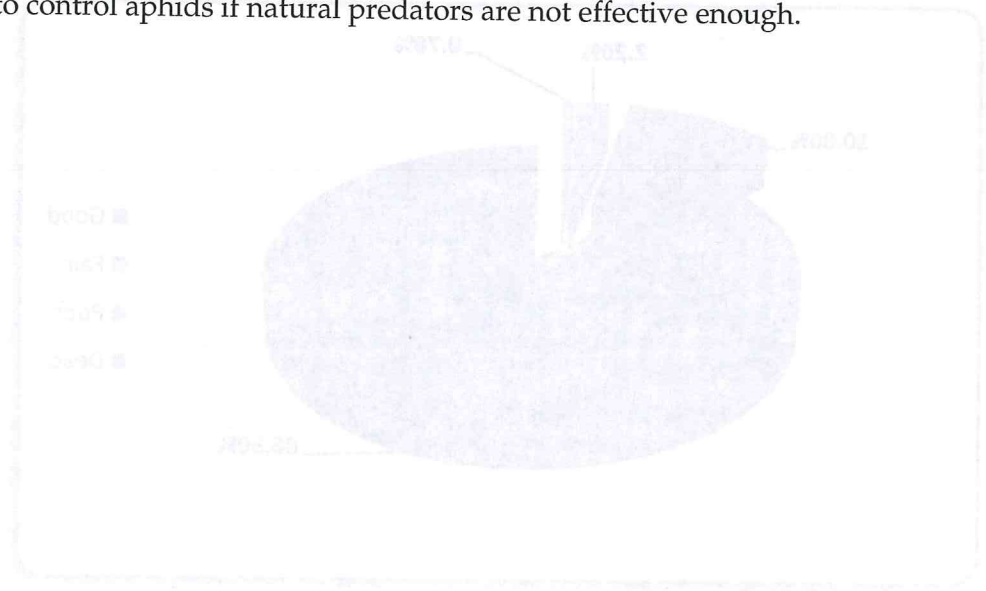
Since most tree diseases cannot be treated in a curative fashion, management efforts must focus on prevention. The best defense against tree pathogens is a healthy tree.

Insects

Insects (primarily aphids and ants) were observed on a total of 57 trees.

The most prominent insect was ants - 39 trees showed signs of recent or previous infestation. They are not considered a serious problem by themselves, but can be an indicator of two different issues with a tree. The first is the presence of decay, where the ants are removing and transporting the softened wood to their dens. The second is a population of aphids; the ants are attracted to the tree for the honeydew the aphids secrete. Where ants were observed it is recommended the trees being further inspected every year to determine if there is decay within the tree and if further action is warranted.

Aphids were observed on tree leaves. They are common to many different trees, shrubs, and plants, and feed by sucking their sap. While some aphid species can harm trees, most do not. If, however, their numbers are high for long periods of time, they can cause leaf wilt and shoot dieback. They are more likely the source of secondary problems though. Their production of honeydew can attract ants as well as stinging insects like wasps and bees. Honeydew also provides a medium for sooty mold to form. Lady beetles are one of the primary natural predators of aphids and help control their numbers. Insecticides or insecticidal soaps may also be used to control aphids if natural predators are not effective enough.

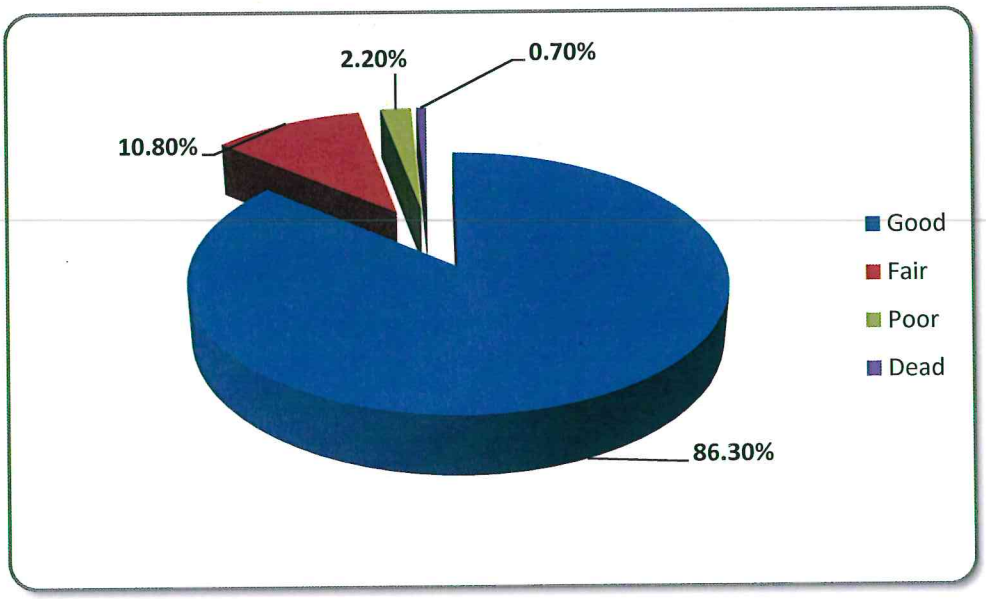


Tree Health and Condition

Each tree that was inventoried was assigned a health and condition rating. These ratings are based on US Forest Service guidelines, using a Good, Fair, and Poor classification system. A tree is considered in good health and condition if there are no apparent problems. Trees are considered in fair health and condition when there are only minor defects or correctable problems. Those considered in poor health and conditions have major problems or defects, such as major dieback in the crown that will ultimately lead to the death or failure of the tree or create a hazardous condition.

Nearly all of the trees of the City of Ogdensburg tree population are in good condition (see also the chart below). This can be attributed to a couple of factors. The first is the high degree of care that has been taken with the maintenance and management of the City trees; pruning has been performed in the past by skilled individuals. It is recommended that as trees are either cared for or replaced, the percentage of trees in good condition will continue to increase.

Many of those trees in fair condition were found to have correctable defects or problems. As maintenance, like deadwood removal, is implemented, many of these trees will likely improve in condition class.



Tree Maintenance

Most trees require some form of regular maintenance. Younger trees may require fertilization, watering, staking, minor pruning for form, etc., while older trees may require regular pruning to remove deadwood, manage weight, and respond to structural defects; in some cases older trees require out right removal. Pruning is one of the more frequent maintenance recommendations made for a tree population. The intent of pruning is to remove all dead wood, crossing branches, and diseased branches from the crown. This is performed as a preventative measure against branch failure and for the removal of hazards, but is also important to manage the aesthetic character and form of a tree.

Pruning is the most common maintenance recommendation for the City of Ogdensburg, followed by inspection and monitoring, and pest treatment.

In many cases the presence of a disease or general decline of individual trees warrants yearly inspection and monitoring. These inspections are important to allow for early detection of tree failure, but also so corrective actions can be taken in an effort to prevent failure.

As requested by the City, all the ash trees located within the right-of-ways and parks were evaluated for treatment as a loss preventative measure in the event the Emerald Ash Borer is discovered in the region. Of the 169 Ash trees 153 are recommended for treatment. It is estimated that the cost to treat all the trees this year will range from $11,500 to $15,000[2] depending on the method the City chooses. It is recommended the city treat the trees with Tree-age utilizing Arborjet's trunk injecting system this spring – there is a known presence of the Emerald Ash Borer in nearby Canada and in the lower Hudson Region in NY. Researchers at Michigan State, Ohio State, Purdue, the University of Illinois, and University of Wisconsin have concluded that Arborjet's trunk-injected systemic insecticides are the most effective treatment options, providing very effective control of EAB for two years, with a single application, even under heavy infestation pressure.[3] For comparison purposes only, if the City does not treat any of the ash trees and they become infested, the estimated cost for removal and replacement would be approximately $72,000, possibly within a single year.

Work orders specific to each tree are organized under separate tabs of this report for only the first year. Future work orders may be generated by the City through TreeWorks as tree data is updated periodically.

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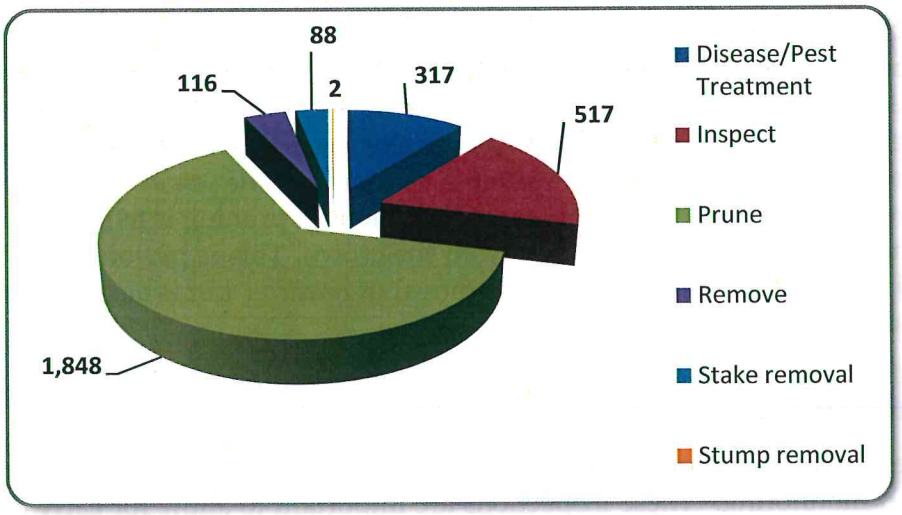
[2] Costs are estimated by the Purdue University Emerald Ash Borer cost calculator: http://extension.entm.purdue.edu/treecomputer/

[3] Insecticide Options for Protecting Ash Trees from Emerald Ash Borer – 2009 Joint research summary by Ohio State University, Michigan State University, Purdue University, University of Illinois and University of Wisconsin Extension.


88
116
2
317
517
1,848
Disease/Pest Treatment
Inspect
Prune
Remove
Stake removal
Stump removal

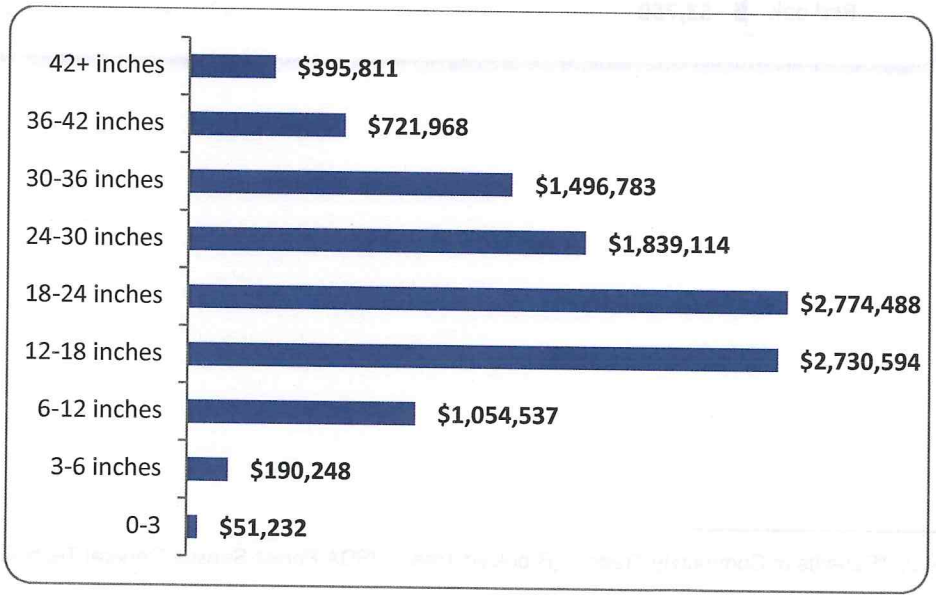
Appraised Value

Total appraised value of the tree population for this report is based on the combined cost of replacing every individual tree. The values associated with shade trees are often quite high, especially in older populations composed of trees with medium and large crown classes. Replacement value is directly related to tree size. As a tree increase in size so too does its cost of replacement.

The total replacement value estimate of all trees managed by the City of Ogdensburg is appraised at $11,254,776.

The chart below clearly shows a relationship between size and value – larger trees have more value. When comparing values between size classes, however, the number of trees within a size class can have as much influence on value for that size class, as does the size of the individual trees themselves. But numbers of trees become less relevant in regards to value in a size class once trees reach large sizes; the replacement value of really large trees is very high and it only takes a few big trees to add up to a lot of value. For example, the replacement value of all trees between 7 and 24 inches totals $6,559,619. The 24+ inch class has significantly less value by itself $4,453,676, but there are only 267 trees ($16,680 per tree) of this size in the city, compared to the 1,591 trees ($4,122 per tree) between 7 and 24 inches. This serves to emphasize the importance of a well-balanced population. The loss of a single large tree can result in a dramatic drop in value.

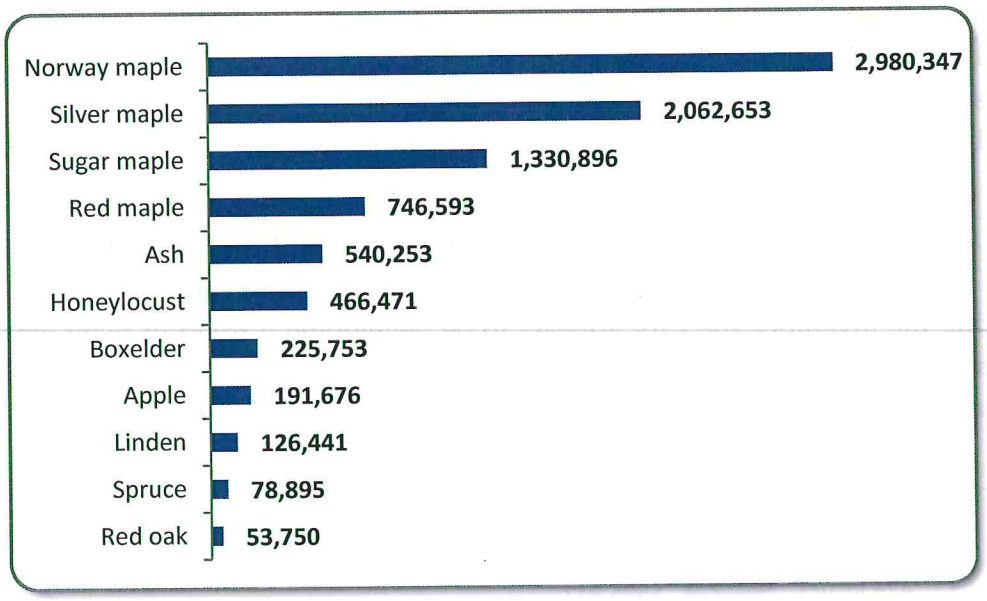
There are some species that will continue to increase in size and subsequently increase in value, if the city continues to plant trees that can achieve a larger diameter. Based on observations made during the inventory the City appears to be developing a trend of plant small diameter growing trees. These trees will not increase dramatically in value over time but do add to the total appraised value of the urban forest. The City can anticipate that the appraised value of its trees will continue to rise as some trees grow larger, and as trees added to the population through its current planting schedules.



Carbon Storage and Sequestration

Climate change is an issue of global concern. Urban trees can help mitigate climate change by reducing atmospheric CO_2 in two distinct ways; first and foremost trees remove (or sequester) CO_2 from the atmosphere through the process of photosynthesis and tie up the associated carbon in the stem, bark, branches, leaves, and roots. Secondly, trees near buildings can reduce the demand for heating and air conditioning, thus reducing CO_2 emissions associated with electric power production[4]. As the size of the trees increase and their health is maintained or improved, the potential for trees to sequester more CO_2 also increases.

The gross carbon stored in the tree population in the City of Ogdensburg is about 9,495,538 pounds (see also chart below). Net carbon sequestration on a yearly basis is 444,563 pounds. This value could be substantially increased through future plantings and long-term stewardship.



[4] Nowak, David J., "Benefits of Community Trees", (Brooklyn Trees, USDA Forest Service General Technical Report, in review)

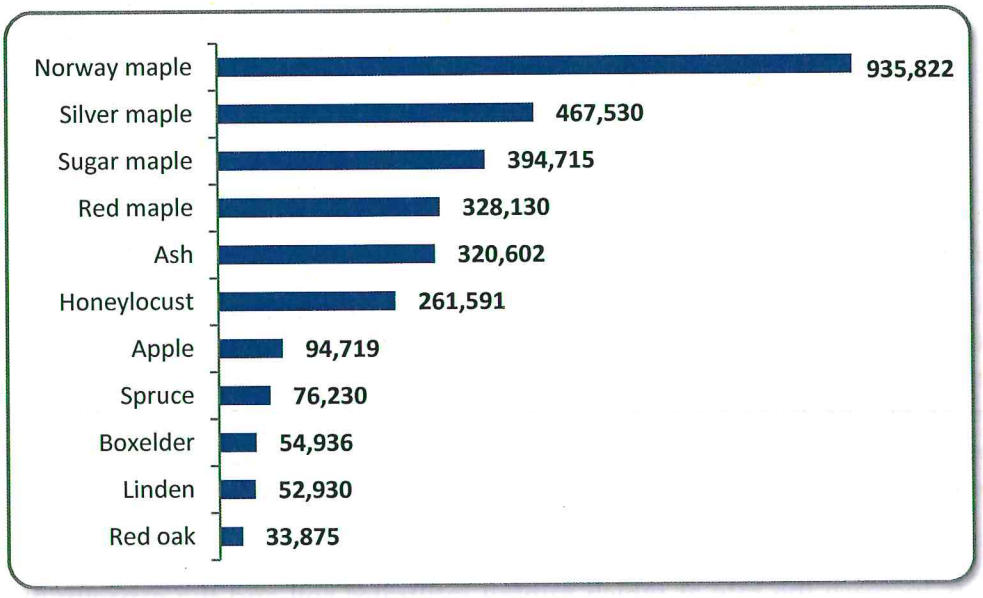
Storm Water Interception

Urban environments are the source of high volumes of runoff water during storm events; these waters are capable of accumulating, transporting, and depositing vast quantities of sediment and pollutants into lakes, streams, and wetlands. The presence of trees can reduce the magnitude of this problem significantly. Trees are mini-reservoirs, controlling runoff at the source, thereby reducing runoff volumes and erosion of watercourses, as well as delaying the onset of peak flows. Trees are capable of directly reducing runoff in several ways:

- Leaves and branch surfaces intercept and temporarily store rainfall.
- Roots increase the rate at which rainfall infiltrates soil and the capacity of soil to store water, reducing overland flow.
- Tree canopies reduce soil erosion by diminishing the impact of raindrops on barren surfaces.
- Transpiration through tree leaves reduces soil moisture, increasing the soil's capacity to store rainfall.

Rainfall is intercepted and stored temporarily on canopy leaf and bark surfaces. Intercepted water evaporates, drips from leaf surfaces, or flows down stem surfaces to the ground. The benefit of interception is essentially measured as the amount of rainfall that does not reach the ground to run off. By substantially reducing runoff, trees can also directly protect water quality, where runoff is responsible for most pollutant wash off.

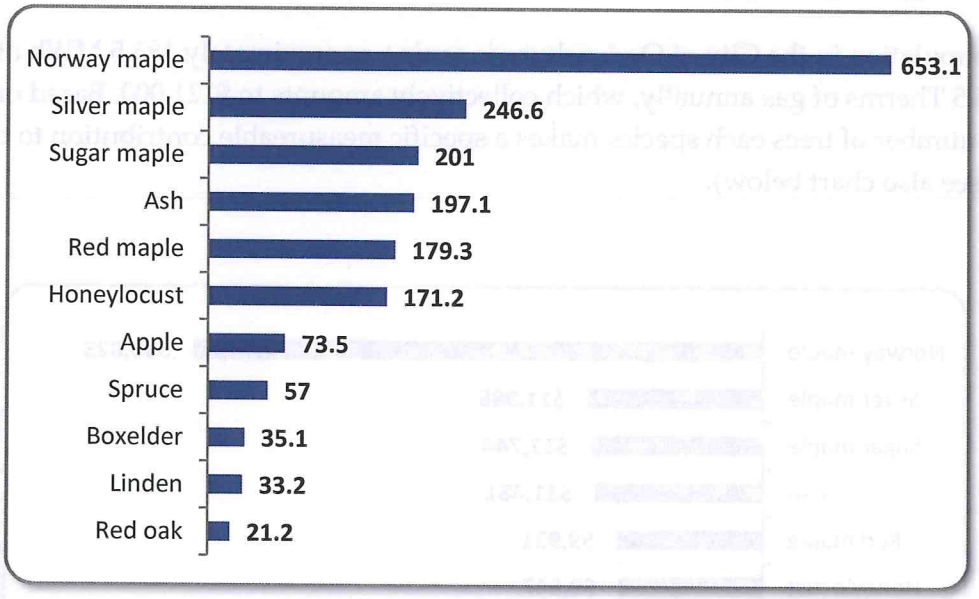
Estimates indicate that the trees in the City of Ogdensburg intercept and defer approximately 3,431,549 gallons of water (see also chart below) on a yearly basis. As the tree population continues to not only increase in number, but also in individual tree size, the volume of runoff will continue to decrease and more rainfall will be taken up and used by the trees.


Norway maple
935,822
Silver maple
467,530
Sugar maple
394,715
Red maple
328,130
Ash
320,602
Honeylocust
261,591
Apple
94,719
Spruce
76,230
Boxelder
54,936
Linden
52,930
Red oak
33,875

Air Quality Improvement

Urban trees provide air quality benefits in four main ways: absorbing gaseous pollutants (e.g., ozone, nitrogen oxides, and sulfur dioxide) through leaf surfaces, intercepting particulate matter (e.g., dust, ash, pollen, smoke), releasing oxygen through photosynthesis, and transpiring water and shading surfaces, which lowers local air temperatures, thereby reducing ozone levels[5]. While all trees provide some measure of benefit, trees in the larger crown class are capable of intercepting more pollutants because of their larger leaf surface area.

The tree population in the City of Ogdensburg is absorbing approximately 2,140 pounds of pollutants annually (see also chart below). Norway maple is one of the more prominent species in the city and has the highest rate of intercepting and absorbing pollutants. This species has a large crown and high leaf surface area making them an ideal tree to provide this environmental benefit. The number of red maple and red oak trees are small by comparison, so their combined rates of interception and absorption are lower, but they also have large crowns and are good at improving air quality. If one of the goals is to improve air quality in the city, trees with large crowns should be considered in future plantings.



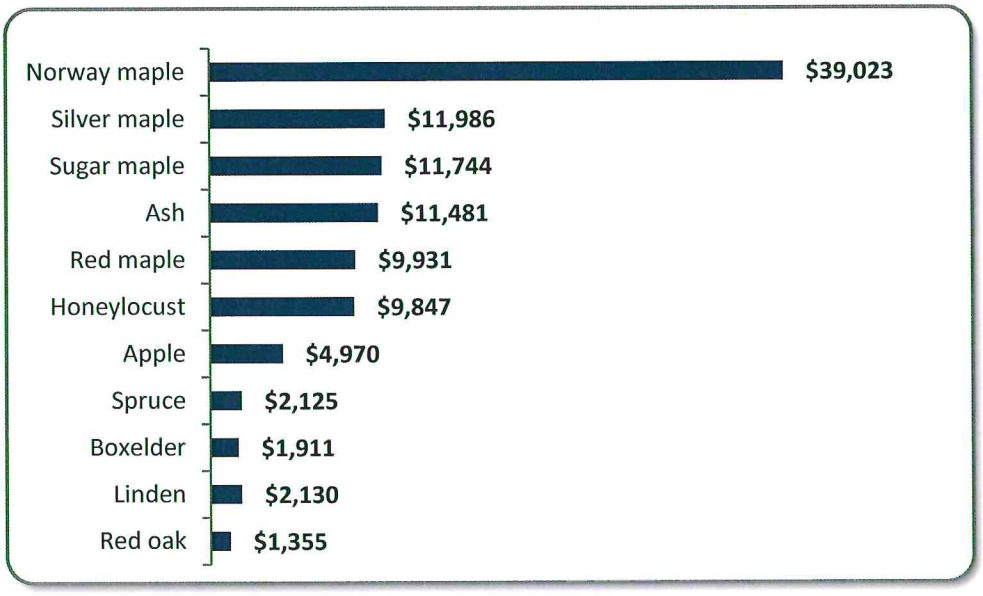
[5] Nowak, David J., "Benefits of Community Trees", (Brooklyn Trees, USDA Forest Service General Technical Report, in review)

Energy Savings

Deciduous trees (trees that lose all of their leaves each fall) save energy in summer by shading houses, buildings, paved areas, and air conditioners. Large and small evergreen trees and shrubs save energy by slowing cold winds in the winter. Both deciduous and evergreen trees save energy in summer by directly cooling the air, this happens as water evaporates from the leaf surfaces.

Crown size and energy savings are directly correlated as can be seen in the chart below. While apple trees are the second most prevalent tree in the inventory and outnumber the red maple trees (which are third), they do not save as much energy as the red maples do. Apple trees have a much smaller crown and do not grow to the height a red maple can; thus they do not provide very effective shade for buildings. This does not mean they are not effective in reducing energy usage, they just don't contribute as much as trees with a larger crown.

The tree population in the City of Ogdensburg is saving approximately 183.5 MWh of electricity and 67965.5 Therms of gas annually, which collectively amounts to $121,000. Based on size and form and number of trees each species makes a specific measureable contribution to energy savings. (see also chart below).



Additional Observations & Recommendations

- A total of 6,389 potential tree planting sites were identified and inventoried. There are approximately 5% more sites with potential for planting trees, but the green space is lost due to soil loss and/or compaction from vehicle parking. The City may want to look at parking options for those areas and discourage parking or driving vehicles on green spaces so more planting sites are available. These areas will need to be restored before trees can be planted.
- Knowing what a City has for an Urban Forest is only the first step in managing the trees. The City is encouraged to update the data yearly to reflect any maintenance, removals, and new plantings. By developing management strategies based on up to date data, the City can improve how work is identified, organized, and completed, and more accurately develop budgets.
- The City is predominantly stocked with species found mainly in the maple family. Monocultures are discouraged by the profession of arboriculture, as it exposes urban communities to a higher level of risk for loss to host specific insects or diseases. As the City continues to expand its urban forest it is recommended that the City diversify its species composition by limiting the number of trees planted from the maple family.
- A total of 169 ash trees are located in the right-of-ways owned and managed by the City. Most of these are recommended for treatment to prevent potential loss to the Emerald Ash Borer, should it find its way into the City. Many of the ash trees are located on major roadways and provide aesthetic beauty and shade for residential homes.

  The City is encouraged to treat the City owned trees, but also develop a cost share program to assist home owners treat the ash trees on private property. It is recommended that the City combine the treatment of City owned trees and privately owned trees at the same time, as there may be greater efficiency and hence the opportunity to keep costs low.
- Many City blocks have a lot of capacity for trees as these areas have many available planting sites that are not being utilized. As the City plans to expand their urban forest, the section of this report found on the accompanying disk labeled Tree Planting Sites can be used to identify those areas with few plantings.

Other Recommendations & Suggested Goals

- Review and update the management plan every 5 years starting at the end of 2017.
- Provide training for staff in professional development. Perhaps through workshops, online seminars, or in house training.
- Develop a yearly budget based on the recommended routine care and inspection of the tree population from the current inventory; the budget should allow room for any unexpected additional maintenance requests. While all costs cannot be budgeted precisely in the first few years of implementing a tree maintenance program, after a routine is developed and many of the recommended maintenance issues are addressed, the City should see a more consistent amount of work that will need to be completed on an annual basis and should be in better position to develop a more accurate budget.
- Develop a procedure for prioritizing service requests and planned work. Ideally, one individual should be assigned to receive all service requests, enter them into TreeWorks, and keep the database up to date.
- Seek and apply for grants to fund tree planting and management needs as needed.
- Educate the public on the Urban Forest. Brochures/pamphlets could be developed and/or articles could be submitted to a local newspaper on a regular basis. Topics that could be covered include, but are not limited to:
  - The Citys tree species composition
  - Tree species recently planted or soon to be planted
  - Invasive insects or diseases
  - Ecological benefits
  - Tree care and maintenance
- Do not allow any species family to exceed ten percent of the total tree population.
  - As new plantings are planned, review the current population and select species accordingly.
  - Annually review and update the list of acceptable tree species for planting.
  - Encourage private property owners to plant tree species on their properties that expand to the City's diversity and discourage species that are already over abundant.
- Utilize the section on the accompanying disk labeled Tree Planting Sites and updated inventory information to plant trees throughout the City to achieve a more even distribution of trees throughout the City.

- Develop a rotational inspection schedule of all trees managed by the City, and conduct yearly inspections.