



Urban Forest Management Plan

Edmonton's Urban Forest – Taking Root Today for a Sustainable Tomorrow





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Edmonton, city on the banks of the North Saskatchewan River. Here amongst majestic trees, green carpets of lawn, flowering shrubs and plants paint the countryside with breathtaking beauty.

William Hawrelak

Edmonton's longest-serving Mayor, 1964

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Devonian Botanic Gardens
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Edmonton Horticultural Society
Edmonton Naturalist Group
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Trees are an important living asset. They play a key role in making Edmonton a livable, sustainable and vibrant city.

Doug Costigan
Director Forestry, Beautification and Environmental Management
2003 to present

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Executive Summary

Edmonton's Urban Forest Management Plan (UFMP) is a 10-year strategy for sustainably managing and enhancing our diverse urban forest so that it will continue to serve this community for generations to come.

The plan provides strategic direction for Edmonton's entire urban forest. This includes all trees within city limits – whether planted, naturally occurring or accidentally seeded. Trees found in parks, natural areas, the river valley, ravines, roadways, roof top gardens, commercial, residential and private lands are all part of the urban forest, and within the scope of this plan.

Collectively, Edmonton's trees represent an irreplaceable asset. The 2010 Corporate Tree Policy tree assessment guidelines estimate the value of the publicly owned portion of our urban forest at more than \$1.2 billion. Unlike other municipal infrastructure, trees increase in value over time.

The urban forest also makes a quantifiable contribution to the long-term livability of our city. Using modeling programs developed by the United States Department of Agriculture and Forest Service, City staff measured our urban forest's ability to clean the air, reduce stormwater runoff and sequester carbon. Combining field observations, meteorological information and air quality readings, Edmonton's forest removed an estimated 531 Tonnes of pollutants in 2009 alone, a feat worth more than \$3 million.

This Urban Forest Management Plan was developed collaboratively, with input from affected stakeholders and the public through focus group meetings and an online questionnaire, as well as informal consultations.

The plan is rooted in four guiding principles:

1. Promote a healthy and sustainable urban forest
2. Engage the community in protecting and managing the urban forest
3. Think globally and regionally; plan and act locally
4. Use best practices, innovation, science, information and technology

In line with those principles, the following three objectives and accompanying strategies guide our work to ensure a diverse and sustainable urban forest for the long term. The strategies and related actions (available in the full plan) have been assigned both a timeframe and a project partner responsible for implementation.

The urban forest is one of Edmonton's greatest assets. It cleans the air and water and creates an environment with safe, interactive and attractive neighbourhoods that we can proudly call home. Along with Edmonton City Council, I am committed to ensuring its long-term maintenance and growth.

Stephen Mandel
Mayor, 2004-Present

Objective 1: Effectively manage, monitor, sustain and ensure the health and growth of Edmonton's urban forest.

SHORT-TERM

Strategy 1.1: Develop and implement programs that will lead to the establishment of a 20% tree canopy coverage through partnerships, residential action, naturalization and additional landscape tree plantings.

Strategy 1.2: Institute best management practices for establishing trees and work to enhance design specifications and development practices.

Strategy 1.4: Identify resources required to implement the UFMP, maintain operations and establish best management standards.

Strategy 1.5: Pursue new methods of supplying adequate water for normal tree growth.

Strategy 1.6: Develop strategies to reduce the impacts of natural disasters on the urban forest.

MEDIUM-TERM

Strategy 1.7: Review models and determine how the urban forest can contribute to low-impact development concepts and ecological network.

LONG-TERM

Strategy 1.8: Research best management practices for tree protection on private lands and develop guidelines and public education material.

Objective 2: The general public, other city agencies, neighbouring communities and partners are informed of the importance and benefits of the urban forest, relevant forestry issues and best management practices.

SHORT-TERM

Strategy 2.1: Increase communication about tree pest issues such as Dutch elm disease and invasive native and exotic insect pests on private and public lands.

Strategy 2.2: Increase awareness about urban forest management issues and related standards.

Strategy 2.3: Continue to develop local and regional information sharing networks.

Strategy 2.4: Communicate the ecological and health

benefits of trees, proper maintenance and water saving through existing programs.

Strategy 2.5: Create stewardship opportunities (e.g., Adopt a Tree) for citizens and communities to play a role in our urban forest.

Strategy 2.6: Promote the long-term establishment and health of trees on local roadways, buffers, school grounds and natural areas.

MEDIUM-TERM

Strategy 2.7: Increase awareness of the benefits of reducing our environmental impact.

LONG-TERM

Strategy 2.8: Enhance partnerships with post-secondary educational institutions to encourage research and development of urban forest knowledge, particularly regarding tree health and sustainability.

Objective 3: Protect native forest and tree stands in conjunction with the Office of Biodiversity.

SHORT-TERM

Strategy 3.1: Work with affected stakeholders to protect natural areas, with emphasis on naturally treed environments.

Strategy 3.2: Review and update the Naturalization Master Plan 2012.

LONG-TERM

Strategy 3.3: Perform a risk and hazard assessment on the natural forest and tree stands and develop associated management plans.

The roadmap provided by the Urban Forest Management Plan will benefit the City of Edmonton as a whole by advancing the following strategic outcomes that are identified in the Way We Live, The Way We Green and The Way We Grow:

1. Preserve and sustain Edmonton's environment
2. Improve Edmonton's livability in the city
3. Transform Edmonton's urban form



Introduction: Enhancing an Invaluable Asset

Edmonton's urban forest represents a significant municipal asset. More than 298,000 publicly owned trees enhance Edmonton's boulevards, roadways and parks. The 2010 Corporate Tree Policy Tree Assessment Guidelines estimates the value of the average boulevard tree at \$2,400 to \$8,000. An elm tree greater than 102 cm (40 inches) in diameter can be worth as much as \$65,000. Collectively, Edmonton's trees are worth more than \$1.2 billion in 2011 – and unlike other infrastructure, trees increase in value over time.

Our urban forest also includes many native trees growing in table lands, ravines, the river valley and other natural areas. To date Edmonton has protected an estimated 379 hectares of table lands and another 3,336 hectares in the river valley and in ravines. Substantial areas of parkland and roadways have also been naturalized with vegetation that includes trees.

Edmonton's urban forest is an important resource that provides direct and tangible environmental, ecological, economic and social benefits to the city and surrounding communities. This valuable ecological network improves our air quality, reduces energy consumption, keeps soil from eroding and conserves water resources. With careful stewardship, these benefits can continue for generations, appreciating over time.

A residential survey conducted by Banister Research and Consulting Inc. in August 2009 (Appendix B) confirms that Edmontonians value and understand the importance of the city's urban forest. Their top three reasons for appreciating trees were beautification, nature appreciation and reduced air pollution. Two thirds of the respondents identified the availability of healthy, mature trees as an important consideration when purchasing a home. Many expressed interest in introducing guidelines for protecting trees on private property. Seventy five per cent agreed that education about the urban forest is important and said the City of Edmonton provides insufficient information on the care and maintenance of trees.

A crowded population, if they are to live in health and happiness, must have space for the enjoyment of that peaceful beauty of nature - which, because it is opposite of all that is sordid and artificial in our city lives - is so wonderfully refreshing to the tired souls of city dwellers. Therefore most of the large cities have provided themselves with parks and large open spaces to be used as parks when necessity requires.

Frederick G. Todd

Canada's first resident
Landscape Architect, 1906

Edmonton's Urban Parks Management Plan (UPMP), in effect since 2006, highlights the need to preserve and expand our urban forest. The UPMP recommended that an Urban Forest Management Plan be developed to ensure that this essential resource remains diverse and sustainable.

This Urban Forest Management Plan (UFMP) responds to that recommendation. A departmental plan developed with support from other departments and the community, it is designed to support other City of Edmonton plans and initiatives.

Figure 1 demonstrates how this plan integrates and aligns with the City's corporate outcomes.

What is the Urban Forest?

Urban forest refers to the trees located within city limits, whether planted or naturally occurring. Trees found in parks, natural/naturalized areas, the river valley, ravines, roadways, private yards, roof tops, commercial and industrial lands are all part of the urban forest.

The City of Edmonton has recognized the value of integrating the natural environment with an urban landscape through its 10-year Strategic Plans. The Way we Green, to preserve and sustain Edmonton's environment; the Way we Live, improving Edmonton's livability; and the Way we Grow, shaping Edmonton's urban form – all call for sustainable green spaces and natural areas, recognizing that our urban forest plays a key role in the city's health and livability.

Lyll Brenneis

Branch Manager, Community Strategy and Development, Community Services

2003 to present



Figure 1. Integration of UFMP with pre-existing plans



History: Involving Citizens in Growing Edmonton's Forest

Although the City of Edmonton is now home to a wide range of tree species, relatively few varieties are native to the region. Early settlers encountered a prairie landscape sparsely populated with aspen, poplar, birch and spruce. The transformation to the diverse urban forest found in Edmonton today has been a long-term effort involving not only the City of Edmonton but also citizens and a wide variety of community partners.

From the early 1900s, the newly incorporated City of Edmonton created boulevards and planted trees to beautify the growing community, both to benefit residents and as a means of attracting newcomers.

A significant amount of the work accomplished in the early years was done through the Edmonton Tree Planting Committee, a collaboration of the City of Edmonton, the Edmonton Horticultural Society and the Edmonton Federation of Community Leagues.

Throughout the 1920s, the committee organized men to go out into the forests surrounding the city, dig up native birches and evergreens and haul them into town using trucks loaned by local wholesale houses. Homeowners took on the responsibility of digging holes and planting the trees on their boulevards, following directions provided in leaflets that were distributed door-to-door. With everyone working together, a vast number of trees as planted in just 10 years.

In 1927, the Edmonton Horticultural Society, in collaboration with the City of Edmonton, started a tree nursery to supply stock for boulevard planting, thus expanding the available species to include elm and ash trees.

Over the years, municipal responsibility for planting and caring for trees has been the purview of a variety of departments. In 1961, the Edmonton Forestry Section was created and assumed responsibility for all trees, our ravines plus insect and pest concerns.

The following year, Queen Elizabeth Park was the site of a major tree trial. A number of species new to the area were planted, including silver maples, sugar maples, ginkgos and oaks.

Since then, the City of Edmonton, community partners, developers, businesses and citizens have continued to expand our range of tree species. This intentional diversification has increased the resilience of Edmonton's urban forest, helping to ensure that this invaluable asset contributes to the beauty of the city and citizens' quality of life today – and far into the future.

*To make us love
our city, we must make
our city lovely.*

Gladys Reeves

Edmonton Tree Planting
Committee, 1923



We live in a symbiotic relationship with trees.

Ray Nyroos
 Director/Supervisor Forestry
 1980-1995



Canopy: Analyzing the Extent of our Urban Forest

The Forestry Unit plays a lead role in enhancing Edmonton’s livability by sustaining and improving today’s urban forest. Besides continuing the important work of maintenance and planting, the unit has taken several significant steps to analyze our forest, laying the groundwork for strategic stewardship.

In 2009, the unit completed a citywide electronic tree inventory of all street, buffer and park trees. The USDA Forest Service Street Tree Resource Analysis for Urban Forest Management (STRATUM), a modeling program for street and buffer trees, was used to confirm that our forest is dominated by American elm and Green ash.

This inventory is proving invaluable for pruning, planting and watering programs. Work done to each inventoried tree is tracked, adding to our bank of knowledge about the forest’s history. Work is also underway to connect the tree inventory to work orders, in order to better plan our work, and to provide detailed information on the origins of Edmonton trees.

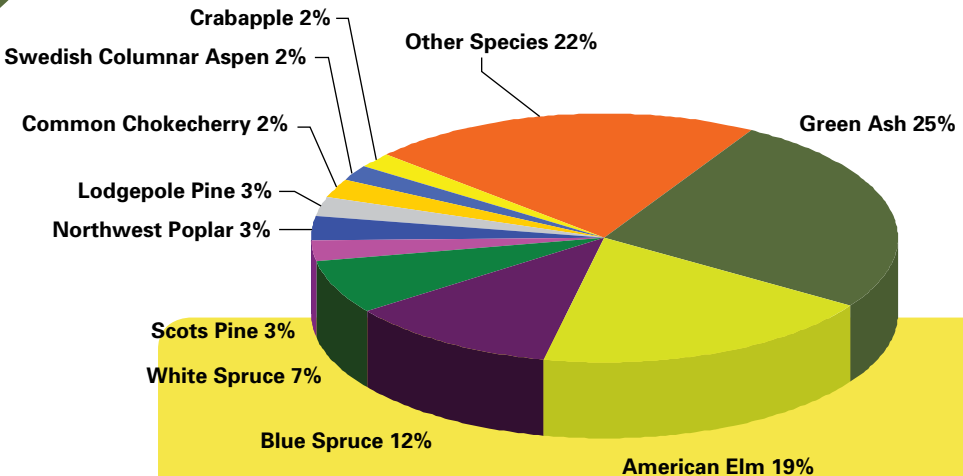


Figure 2. Species distribution of Edmonton street trees

Inventory of Edmonton’s street, buffer and park trees using United States Department of Agriculture Street Tree Resource Analysis for Urban Forest Management (STRATUM), 2012

In 2009, City staff analyzed the environmental effects, value and structure of Edmonton’s entire urban forest using the Urban Forest Effects (UFORE) modeling program. Part of the U.S. Department of Agriculture Forest Service i-Tree Software suite, the program uses a combination of field observations, meteorological information and pollution data to calculate how effective the urban forest is in cleansing the air, sequestering carbon and reducing stormwater runoff. Edmonton is the fifth city in Canada to complete a UFORE analysis.

The UFORE model gives us crucial information for understanding Edmonton’s urban forest. For example, we now have an overview of our top 10 species by canopy cover (Figure 3). Note that aspen and poplar dominate the canopy due to the prevalence of those trees in naturally occurring areas of the forest. This contrasts to the street tree inventory, where elm and ash dominate.

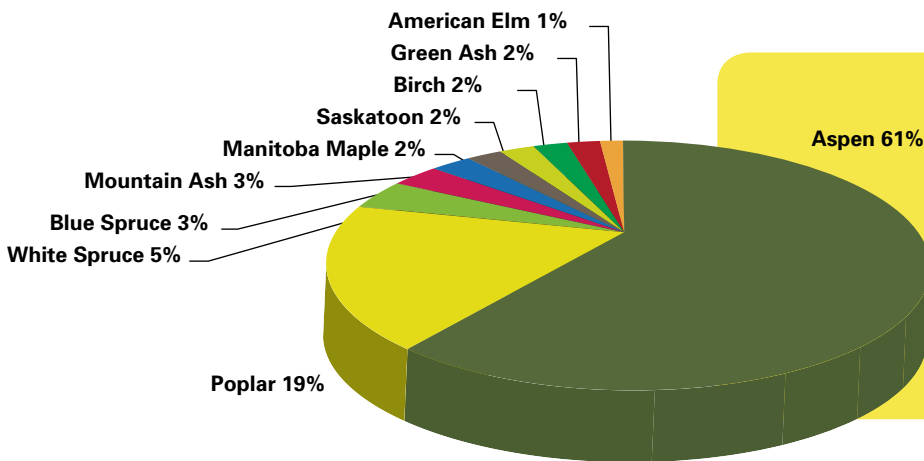


Figure 3. Top ten tree species in Edmonton by canopy cover

Using USDA Urban Forest Effects (UFORE) model, 2009

We also know where the canopy is concentrated (Figure 4). More than half of the canopy exists in residential areas, and another quarter in mixed agricultural/residential areas.

Land Use	% Tree Canopy	Estimated Number of Trees
Ag/Urban Residential	7.60	3,475,220
Commercial	5.00	142,787
Industrial	8.40	693,328
Direct/Other (roadways)	1.30	26,550
Park and Natural areas	14.80	1,008,891
Residential	15.50	7,155,637
Institutional	8.40	305,778
CITY TOTAL	10.30	12,808,191

Figure 4. Edmonton's complete tree canopy
Using USDA Urban Forest Effects (UFORE) model, 2009

We can also compare Edmonton's canopy with the canopies found in other urban centres (Figure 5).

City	Current Tree Canopy %	Future Tree Canopy target %
Calgary	7.1	20
Kelowna	13	25
Oakville	29.1	30
Ottawa	27	30
Toronto	20.5	30
Edmonton	10.3	20

Figure 5. Average tree canopy in Canadian cities
Sources: Municipalities, USDA Forest Service, 2007; UFORE



Value: Quantifying the Benefits of our Urban Forest

The urban forest provides Edmonton and surrounding communities a wide range of important environmental, economic, social and health benefits. Having inventoried our trees, City staff were able to quantify those benefits using UFORE and STRATUM modeling software.

ENVIRONMENTAL AND ECOLOGICAL BENEFITS

- Reduces the heat island effect that occurs as urban development modifies land surfaces.
- Improves air quality by filtering dust and absorbing ozone, carbon monoxide, sulphur dioxide, nitrogen oxides, airborne ammonia and heavy metals.
- Improves water quality by shading streams, lowering water temperature and filtering out pollution that would otherwise enter the river.
- Moderates temperatures, reducing the energy needed for heating and cooling.
- Counteracts greenhouse effects and global climate change by removing carbon from the atmosphere and releasing oxygen for people to breathe.
- Reduces exposure to ultraviolet (UV) rays by offering shade and absorbing up to 95% of UV radiation.
- Provides essential habitats and corridors for wildlife movement while linking humans to our natural environment.
- Reduces damage from stormwater runoff by absorbing rainfall or delaying its flow into drainage areas.

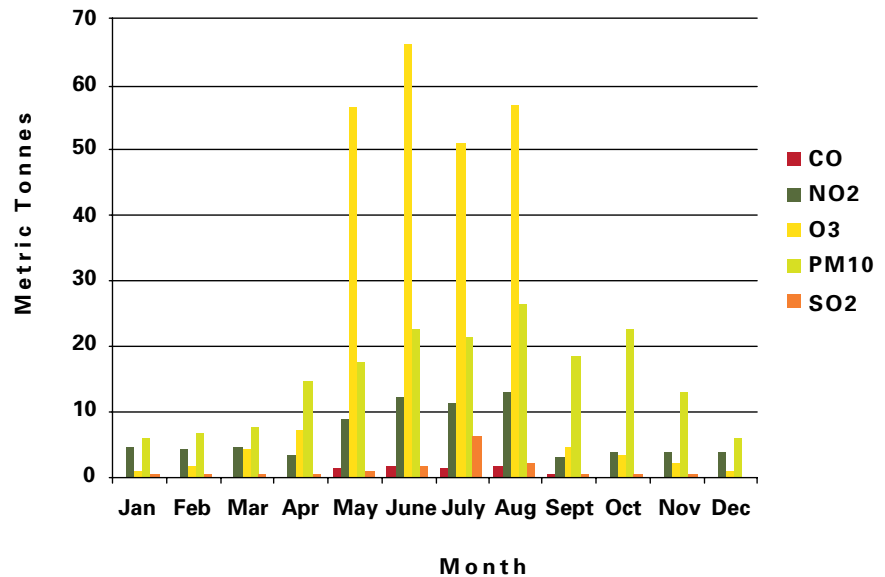


Figure 6. Pollution removed by Edmonton street trees each month

Calculated in metric tonnes using USDA Urban Forest Effects (UFORE) model, 2009

Edmonton's ecological network is an intrinsic part of its future; it is what makes a city both beautiful and livable. It provides outdoor classrooms, meeting places and recreational areas that contribute to the way residents live work and play in the city.

Lyllal Brenneis

Branch Manager, Community Strategy and Development

2003 to present

As a result, we now know how much our street trees (in boulevards, centre medians and buffer zones) cleanse the air, sequester carbon, conserve energy, reduce stormwater runoff and increase property values. We know the quantity of particular pollutants removed every month (see Figure 6). And we know that our street trees removed an estimated 531 metric tons of pollutants in 2009 alone (see Figure 7), an ecological service worth more than \$3 million.

Pollutants removed by Edmonton street trees	Metric Tonnes removed/year	Value in Canadian dollars/year
Carbon monoxide (CO)	6.07	\$5,824
Nitrogen dioxide (NO2)	75.93	\$512,709
Ozone (O3)	254.25	\$1,712,673
Particulate matter (PM10)	181.84	\$819,744
Sulfur dioxide (SO2)	13.22	\$21,850
Total	531.31	\$3,076,800

Figure 7. Amount and value of pollution removed by Edmonton trees

Annual benefits calculated using USDA Urban Forest Effects (UFORE) model, 2009

ECONOMIC BENEFITS

- Reduces energy costs for winter heating and summer cooling as much as 25% when trees are sited to provide shade and windbreak.
- Increases land and property values as much as 20% when landscaped and tended; properties near green spaces also have higher value.
- Attracts and maintains businesses and tourism, contributing to economic stability as well as community spirit and pride.
- extends the life of hard infrastructure such as sidewalks and roadways.

SOCIAL AND HEALTH BENEFITS

- Provides aesthetic value and improves quality of life.
- Creates a sense of privacy and adds character to surroundings.
- Reduces crime by revitalizing neighbourhoods and fostering the social ties needed to empower citizens.
- Reduces recovery time for people recuperating from surgery.
- Promotes environmental responsibility and ethics.
- Reduces stress—people who drive to work along tree-lined streets arrive less stressed than those who travel along roadways without trees.
- Calms the speed of traffic

A single mature tree can absorb 26 pounds of carbon dioxide a year.

*City of Edmonton Benefits of Growing Trees URL
http://www.edmonton.ca/environmental/conservation_landscaping/benefits-from-growing-trees.aspx*

Taking into account Edmonton's population, forest management costs, electricity rates and other crucial information, staff used STRATUM to tally the financial benefits and costs of our boulevard, centre median and buffer trees, focusing on the following parameters:

1. structure (species composition, extent and diversity)
2. function (environmental and aesthetic benefits)
3. value (annual monetary value of the benefits provided and costs accrued)
4. management needs (diversity, canopy cover, required pruning).

The STRATUM analysis tells us that the average benefit per tree in Edmonton's urban forest amounts to \$88.22 a year. The annual cost of caring for our forest averages \$23.78 per tree, resulting in a net benefit per tree of \$64.44. As illustrated in Figure 8, the species providing the most overall benefits to Edmontonians are Manitoba maple, Balsam and Northwest poplar and Green ash.

Aesthetic benefits are considerable for all species; indeed, research shows that people prefer to shop, live and visit areas with tree-lined streets and inviting natural areas. Taken together, other benefits add up to significant value per tree every year. For the dollar values assigned to those benefits and the figures used to calculate net benefit per tree, see Appendix D.

Average Annual Benefits of Public Trees by Species (\$/Tree) using STRATUM Resource Analysis

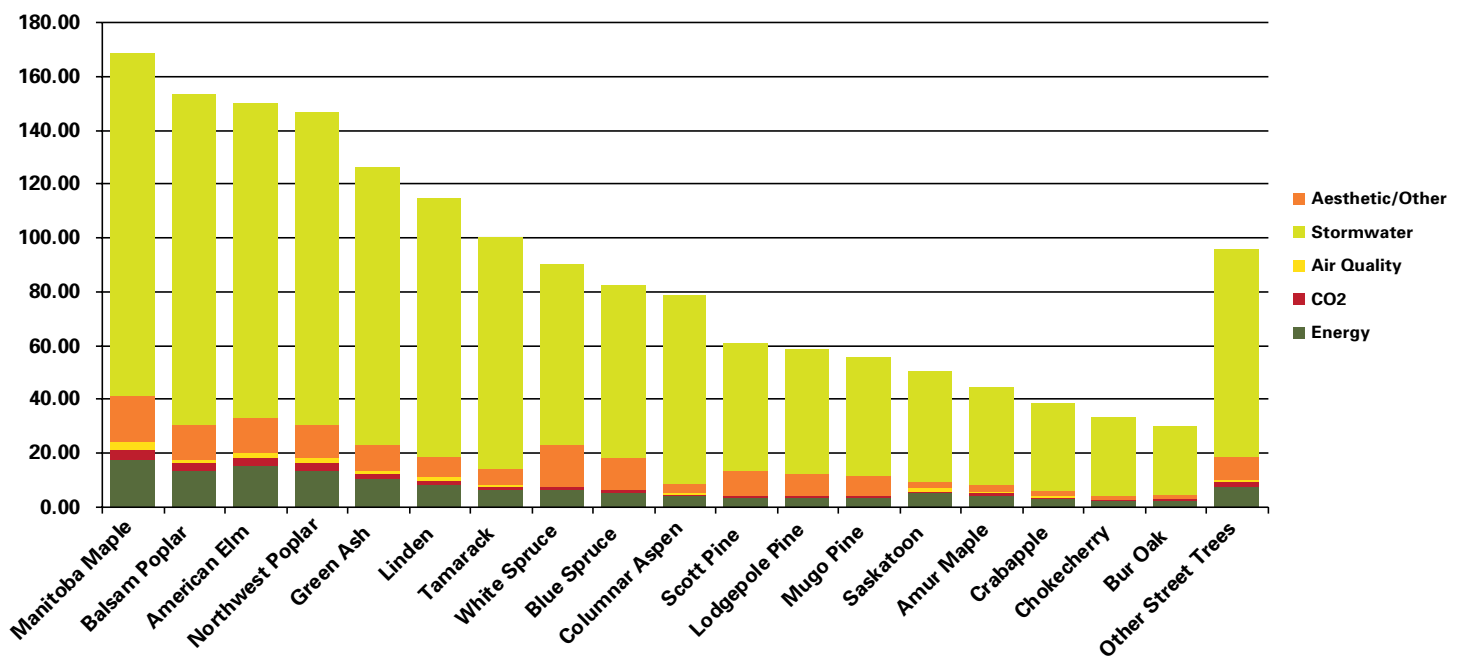


Figure 8. Annual benefits of public trees by species

Using USDA STRATUM resource analysis, 2009

Give a tree an opportunity and they will not disappoint you

Ray Nyroos

Director/Supervisor Forestry
1980-1995



Ongoing Care: Role of Forestry, Beautification, Environmental Management and Associated Services

The Forestry, Beautification and Environmental Management Section is part of the Neighbourhood Parks and Community Recreation branch in the Community Services Department. The City's Corporate Tree Policy C456A assigns responsibility for Edmonton's tree canopy to this section. Key responsibilities include procuring, maintaining, protecting and preserving trees on City property.

Forestry, Beautification and Environmental Management works with three (soon to be four) operating districts and the Office of Biodiversity to steward Edmonton's natural assets – our parks, river valley and ravine systems as well as other natural or naturalized areas that make up our urban forest. To maintain and enhance our urban forest, staff monitor and care for inventoried assets using proper arboriculture standards and foster citizen stewardship through public education and participatory programs.

The Forestry Unit includes the following teams: Operations, Contracts and Policy, Environmental Management, Beautification and Naturalization, Old Man Creek Nursery and Urban Forestry Management.

Forestry Operations maintains more than 298,000 (2011) landscape trees in parks and along roadways, providing arboriculture services, such as planting and pruning, all across the city. Trees are pruned on average every seven years, with the exception of elms, which are pruned every four.

Forestry **Contracts and Policy** oversees contracted tree pruning, tree watering, and enforcement of Corporate Tree Policy C456a. Staff help to protect trees in construction areas through education and remediation and conduct tree hazard assessments in natural tree stands. They also do tree planting reviews and inspections.

Environmental Management ensures that the section promotes the development of environmentally sustainable land management practices through its ISO 14001 certified

environmental management system and a commitment to prevent pollution, comply with regulations and continually improve on environmental performance.

Beautification and Naturalization encourages the growth of grassroots beautification, natural environments and greening of the city through such strategies as Partners in Parks, Community Gardens, Community in Bloom, and Naturalization. These partnerships enable the City to leverage resources, enhancing quality of life in the city in concert with the residents we serve.

Urban Forestry Management updates and maintains the citywide electronic tree inventory, monitors tree health through an assessment program and leads the work of developing and implementing the Urban Forest Management Plan.

Staff at the City-owned **Old Man Creek Nursery** purchase and grow plant material for Parks Design and Construction projects, for naturalization and for Forestry Operations' tree replacement program. Located beyond the city's northeast limits on Clover Bar Road, the nursery ensures a ready supply of locally grown hardy trees at a competitive cost.

The nursery also participates in trials aimed at expanding the diversity of plant material hardy to Edmonton's growing conditions. For example, the nursery is part of the Regional Woody Plant Test Project 2008 and the Prairie TRUST (Trial for Rural and Urban Shade Trees) in partnership with the Landscape Alberta Nursery Trades Association and the Western Nursery Growers Group.

Environmental Services follows Integrated Pest Management (IPM) procedures to control urban forest pests. Using the IPM approach, they identify, monitor and, when necessary, suppress pests using economically and environmentally sound practices.



Civic Commitment: The Urban Forest Management Plan

The **Urban Forest Management Plan** (UFMP) is intended to ensure a diverse and sustainable urban forest that improves the quality of life for Edmontonians for generations to come. This initial plan covers a 10-year implementation horizon and sets three umbrella objectives.

Objectives

1. Effectively preserve, enhance, manage, sustain and ensure the growth of Edmonton's urban forest.
2. Educate the public, other agencies, neighbouring communities and community partners on the importance of the urban forest, relevant forestry issues and best management practices.
3. Protect native forest and tree stands in collaboration with the Office of Biodiversity.

Relevant Policy

The UFMP is supported by Corporate Tree Policy # C456A. Amended and approved by City Council in April 2010, that policy states the following:

Edmonton's tree canopy, including all ornamental trees and natural treed areas on City property (with the exception of land under the jurisdiction of senior levels of government) is the responsibility of the City of Edmonton. These responsibilities shall include procurement, maintenance, protection and preservation of City trees.

Developing the Plan

The Urban Forest Management Plan was developed collaboratively with input from multiple stakeholders, including members of the public and affected interest groups. The plan is informed by extensive review of existing urban forest management plans and best practices.

Work on the plan occurred in the following five phases.

- **Phase 1:** Research and plan development, including these steps:
 - Research other urban forest management plans in search of best practices
 - Review relevant literature, including internet-based research
 - Assess community needs
 - Develop a stakeholder consultation plan
 - Gain sponsor approval of project plan
- **Phase 2:** Work with the project team to develop vision, objectives and action items.
- **Phase 3:** Work with the internal advisory group to develop a draft version of the plan to be reviewed by stakeholders.
- **Phase 4:** Seek input on the draft plan from a broad range of stakeholders, including advisory groups, public focus groups and the resource group. Based on that feedback, make necessary revisions.
- **Phase 5:** Submit plan for review and approval by the City's Corporate Leadership Team and forward to City Council for information.

As an enthusiastic supporter for the preservation of Edmonton's urban forest, I encourage all Edmontonians to take a personal interest in the health and wellbeing of the trees and urban forest in their neighbourhoods. We must nurture our urban forest to maintain its beauty and benefit for future generations.

Linda Sloan

Edmonton City Councillor
2004 to present

Our Vision for Edmonton's Urban Forest

To communicate our intent for the future of Edmonton's urban forest, the project team established the following vision statement:

To have a diverse and sustainable urban forest that enhances the beauty of Edmonton and contributes to wellbeing and quality of life for future generations.

Guiding Principles

The following four principles define the intent of the plan and establish the fundamental beliefs that will guide the City of Edmonton's actions regarding our urban forest.

1. Promote a healthy, diverse and sustainable urban forest in Edmonton.
 - a. Urban forests are managed for the benefits they provide residents. These benefits include air and water quality improvements, reduced energy needs, carbon sequestration and aesthetics.
 - b. An urban forest that is diverse in number of species and age is better able to withstand insect infestations and severe weather conditions.
2. Inform and engage the community in the work of protecting and managing the urban forest.
 - a. Education creates a sense of ownership and pride and helps residents understand their role in growing, preserving and enhancing the urban forest for future generations.
 - b. Nearly 45% of the trees are located on private property in residential and business areas making them important partners in the development and health of the urban forest.
3. Think globally and regionally; plan and act locally.
 - a. Ecological boundaries do not coincide with administrative boundaries. Decisions made locally may significantly impact neighbouring jurisdictions.

4. Use best practices, innovation, science, research, information and technology applicable to the Edmonton area.
 - a. Urban forestry knowledge, science and technologies are continually improving. To meet the growing needs of the urban forest, it is important to stay abreast of current best practices.
 - b. To sustainably manage an urban forest in a prairie environment, the City of Edmonton needs to develop and embrace innovative approaches, being open to progressive thinking and change.

Intended Outcomes

1. Preserve and sustain Edmonton's environment by
 - improving the air quality index
 - reducing stormwater runoff
 - preserving natural and public areas
2. Improve Edmonton's livability by
 - ensuring that public green spaces are attractive and well maintained
3. Transform Edmonton's urban form by
 - adopting best management practices
 - preserving natural areas and public spaces

Responsibility

The Principal of Forestry will be responsible for implementing the plan, recognizing that other stakeholders will play significant roles in ensuring its success. Responsibility for each action will be assigned to project partners.

Strategies and Actions

The City of Edmonton will achieve a diverse and sustainable urban forest by focusing on three objectives using the following strategies and actions. To guide future planning, each strategy is assigned a priority and a timeframe for action.

Timeframes

- Short Immediate to 3 years
- Medium 4 to 7 years
- Long 8 to 10 years

OBJECTIVE 1: EFFECTIVELY MANAGE, MONITOR, SUSTAIN AND ENSURE THE HEALTH AND GROWTH OF EDMONTON'S URBAN FOREST.

SHORT-TERM STRATEGIES AND ACTIONS

Strategy 1.1 Develop and implement programs that will lead to the establishment of a 20% tree canopy coverage through partnerships, residential action, naturalization and additional landscape tree plantings.

Action a: Review and establish tree canopy targets for specific land uses (i.e., residential, commercial, industrial).

Action b: Identify ways of achieving target canopy levels, such as increasing naturalized tree plantings.

Present Practice:

- *The City of Edmonton has a 10.5% tree canopy.*
- *The City replaces all trees that are lost due to drought, infrastructure renewal and construction projects, as resources become available.*
- *To maintain tree health and safety, an annual tree health assessment is performed on approximately one half of the publicly owned trees, alternating between the north and south sides of the North Saskatchewan River; trees are pruned, treated, removed and replaced based on this assessment.*
- *Trees are pruned for structure, tree health, public safety and utility clearance.*
- *The City currently plants 5,000 - 7,000 trees in new developments.*

Strategy 1.2: Institute best management practices for establishing trees and work to enhance design specifications and development practices.

Action a: Update and develop tree planting standards in industrial, residential and commercial areas to reflect best management practices.

Action b: Establish planting standards (e.g., soil volume, type, location and use) to improve tree health and ensure an average 50-year lifespan for trees.

Action c: Ensure that consultants and contractors meet City standards through consistent inspections.

Action d: Ensure that tree preservation is a priority in all new development designs.

Present Practice: Contractors and consultants must meet existing City standards.

Strategy 1.3: Enhance/strengthen design specifications and development practices for sustainability in consultation with associated stakeholders.

Action a: Collaborate with stakeholders to incorporate best management practices and emerging industry standards in future updates of City of Edmonton Design and Construction Standards.

Present Practice: Current design and construction standards set a baseline for design requirements, including plant health.

Strategy 1.4: Identify resources required to implement the UFMP, maintain operations and establish best management standards.

Action a: Base resource requirements on best management practices and standards.

Action b: Work with educational institutions to ensure availability of personnel with expertise in urban forestry.

Present Practice:

- *Edmonton has established Plant Health Care strategies and an Integrated Pest Management policy to ensure a healthy urban forest that is able to manage pests and disease.*
- *The City has many public programs that support the planting of trees on public land, i.e. Naturalization program, Commemorative Tree Program, and the Tree Donation program.*

Strategy 1.5: Pursue new methods of supplying adequate water for normal tree growth.

Action a: Research and develop alternative sources of water for publicly owned trees.

Action b: Pursue civic partnerships for water recycling opportunities (e.g., drainage, waterpark wastewater, discharge strategies).

Action c: Research and develop irrigation systems, when feasible, for boulevards, parks and open spaces.

Present Practice: All newly planted trees are watered, at minimum, the first three years after being planted. Water is applied directly to the trees by probe, ooze tube® or Gatorbag®.

Strategy 1.6: Develop strategies to reduce the impacts of natural disasters on the urban forest.

Action a: Identify risks and develop response plans, monitor for threats such as local and invasive pests and anticipate adverse weather phenomena.

Action b: Research and develop a Tree Risk Management Plan.

Present Practice:

- *Our urban forest is monitored for many invasive alien species such as Emerald Ash Borer and Dutch Elm Disease and its vectors.*
- *To guide us in the event of future storms, a Storm Response Plan has been developed.*
- *The city performs an annual tree health assessment, to detect early forest health issues.*

MEDIUM-TERM STRATEGIES AND ACTIONS

Strategy 1.7: Review models and determine how the urban forest can contribute to low-impact development concepts and ecological network.

Action a: Develop a model and a review process to encourage development of low-impact neighbourhoods.

Action b: Research, develop and adopt industry standards and best practices for low-impact development.

Action c: Maintain local topsoil in parks, on boulevards and open spaces or replace with soil of equal or better quality where required.

Action d: Add shade trees in parks, on boulevards and along roadways where tree planting opportunities are available.

Present Practice:

- *All development plans are reviewed for plant material and placement.*
- *All trees that are removed are replanted within the same neighbourhood.*

LONG-TERM STRATEGIES AND ACTIONS

Strategy 1.8: Research best management practices for tree protection on private lands and develop guidelines and public education material.

Action a: Promote planting, protection and preservation of trees on public and private land.

Action b: Maintain tree protection through policies, standards and bylaws, including the Corporate Tree Policy and Community Standards bylaws.

Present Practice:

- *Extensive information is available about publicly owned trees on construction sites.*
- *The Corporate Tree Management Policy ensures the protection of trees on public property*

OBJECTIVE 2: THE GENERAL PUBLIC, OTHER CITY AGENCIES, NEIGHBOURING COMMUNITIES AND PARTNERS OF THE IMPORTANCE AND BENEFITS OF THE URBAN FOREST, RELEVANT FORESTRY ISSUES AND BEST MANAGEMENT PRACTICES.

SHORT-TERM STRATEGIES AND ACTIONS

Strategy 2.1: Increase communication about tree pest issues, such as Dutch elm disease and invasive native and exotic insect pests on private and public lands.

Action a: Provide accurate, updated information on the website, in the media and through the Master Naturalist Program.

Present Practice:

- *The Forestry Unit is an active member of the Society to Prevent Dutch Elm Disease, a non-government agency in Alberta whose mandate is to preserve and protect Alberta's elms from Dutch elm disease.*
- *Publicly owned trees are monitored for tree health and possible pest and disease infestations.*

Strategy 2.2: Increase awareness about urban forest management issues and related standards.

Action a: Review and update design standards and inform affected stakeholders (contractors, private industry and the public) about actions needed to sustain our urban forest.

Present Practice: The City participates in regular meetings with the Urban Development Institute (UDI) and industry representatives regarding park development and planning issues.

Strategy 2.3: Continue to develop local and regional information sharing networks.

Action a: Distribute urban forestry information through existing networks, such as educational institutions, horticulture and urban forestry organizations, commercial companies and neighbouring communities and districts.

Present Practice: Accurate and up-to-date information regarding arboricultural best management practices, tree facts and urban forest issues is available on the City website, through workshops, public meetings and brochures.

Strategy 2.4: Communicate the ecological and health benefits of trees, proper maintenance and water saving through existing programs.

Action a: Partner with like-minded conservation programs to provide information on urban forest issues using existing communication vehicles (e.g., Master Composter/Recycler, Master Naturalists, Good Growing Neighbours, Tree Donation and Commemorative Tree programs).

Present Practice: Urban Forest Management and Environmental Services help to meet the education curriculum expectations regarding trees with elementary school children at City Hall School.

Strategy 2.5: Create stewardship opportunities (e.g., Adopt a Tree) for citizens and communities to play a role in our urban forest.

Action a: Include an urban forest module in existing conservation programs, including the Master Composter/Recycler Program.

Present Practice: The City of Edmonton offers community awareness, education and tools through various shared stewardship opportunities, such as the Master Naturalist Program, Planning Academy, Arbor Day and Communities in Bloom.

Strategy 2.6: Promote the long-term establishment and health of trees on local roadways, buffers, parks, school grounds and natural areas.

Action a: Gain developer and local resident support for planting and caring for trees through education and promotion.

Action b: Promote the benefits of trees in industrial and commercial areas through education, media and promotional material.

Present Practice: The City of Edmonton has many tree planting initiatives, including naturalization projects, that help to preserve and sustain the environment and improve the city's livability.

MEDIUM-TERM STRATEGIES AND ACTIONS

Strategy 2.7: Increase awareness of the benefits of reducing our environmental impact.

Action a: Promote benefits of reducing our environmental impacts through brochures, website information and media.

Present Practice: The City of Edmonton Forestry Unit provides and facilitates ongoing training opportunities for staff and industry.

LONG-TERM STRATEGIES AND ACTIONS

Strategy 2.8: Enhance partnerships with post-secondary educational institutions to encourage research and development of urban forest knowledge, in particular regarding tree health and sustainability.

Action a: *Develop collaborative research programs (e.g., core composting) aimed at enhancing the urban forest.*

Action b: *Promote the development of urban forest programs at secondary institutions.*

Present Practice: The City of Edmonton Forestry Unit plays an important role in fostering regional cooperation on urban forestry issues.

OBJECTIVE 3: PROTECT NATIVE FOREST AND TREE STANDS IN CONJUNCTION WITH THE OFFICE OF BIODIVERSITY.

SHORT-TERM STRATEGIES AND ACTIONS

Strategy 3.1: Work with affected stakeholders to protect natural areas, with emphasis on naturally treed environments.

Action a: Identify areas of transition from native forest to landscaped park and ensure uses are sensitive to the needs of both humans and the forest environment.

Action b: Monitor and control invasive pests to help protect natural areas.

Action c: Adopt and implement the Natural Areas Management Plan in relation to public safety, tree succession and re-vegetation and tree inventory.

Action d: Involve volunteers (citizens, neighbourhoods, businesses and organizations) in naturalization plantings.

Action e: Provide opportunity for hands-on planting experiences to create ownership and appreciation of urban natural areas.

Present Practice: The City monitors the interface between natural areas and private properties to ensure the safety of abutting properties.

Strategy 3.2: Review and update the Naturalization Master Plan 2012.

Action a: Enhance naturalization programs to add tree canopy to roadways and in areas designated for restoration.

Present Practice: The City of Edmonton Forestry Contract and Policy Unit monitors natural tree stands for issues that may affect public safety.

LONG-TERM STRATEGIES AND ACTIONS

Strategy 3.3: Perform a risk assessment on the natural forest and tree stands and develop associated management plans.

Action a: Create a hazard tree inspection plan for native forests and tree stands that are adjacent to roads, pathways, private property and parks.

Action b: Review the FireSmart Program, assess the risk of fire in our urban forest and develop applicable plans in conjunction with the Office of Emergency Preparedness.

Present Practice: The City uses best management practices to maintain representative native tree stands.

Edmonton has been unusually blessed in natural beauty, and is only requires the united efforts of those who guide her destinies and her citizens, to make this the outstanding City for beauty in Canada.

Gladys Reeves
Edmonton Planting Committee, 1927



In Conclusion: Next Steps

The Urban Forest Management Plan is a living document that provides strategies and actions to help us wisely manage our urban forest. With this guiding document in hand, the next step will be to develop an implementation plan to ensure that Edmonton continues to have a diverse and sustainable urban forest able to enhance wellbeing and quality of life.

The implementation plan will focus on the strategies and action plans outlined in this plan, identifying system indicators, responsible parties, timelines, and future budget requirements. The Principal of Forestry will create and carry out the implementation plan in collaboration with the project partners responsible for each action.

A healthy diverse urban forest is an irreplaceable asset that contributes to Edmonton's long-term livability. This resource provides direct tangible environmental, ecological, economic and social benefits by improving our air quality, reducing energy consumption, keeping soil from eroding and conserving water resources. With careful stewardship, these benefits can continue for generations.





Appendix A

Glossary

Arboriculture: The planting and care of woody plants, especially trees.

Biodiversity: The number and variety of organisms found within a specified geographic region; the variability among living organisms on the earth, including the variability within and between species and within and between ecosystems.

Canadian Nursery Certification Institute's Phytosanitary Certification Program: Developed by the British Columbia Landscape and Nursery Association (BCLNA) and Canadian Nursery Landscape Association (CNLA) in conjunction with the Canadian Food Inspection Agency (CFIA), Agriculture & Agri-Food Canada and the BC Ministry of Agriculture and Lands, this certification is designed to minimize the risk of spreading Sudden oak death *Phytophthora ramorum* among North American nurseries.

Canopy: The uppermost layer in a forest, formed by the crowns of the trees.

Collaboration: When a multi-stakeholder group representing a range of interests participates in a process of shared learning, negotiation and consensus-based decision-making.

Corporate Tree Policy: Policy C456A to protect trees on municipal property approved and amended by City Council in April 2010. Under this policy, Edmonton's tree canopy (except land under the jurisdiction of senior levels of government) is the responsibility of the City of Edmonton.

Dutch Elm Disease: A disease of elm trees caused by the fungus *Ceratocystis ulmi*, characterized by brown streaks in the wood and resulting in eventual death of elm trees.

Ecological Network: A coherent system of natural and/or semi-natural elements that is configured and managed with the objective of maintaining or restoring ecological functions as to conserve biodiversity.

Edmonton Strategic Plan - The Way Ahead: A plan initiated and approved by City Council that provides a vision of Edmonton in 2040.

Environmental impact: Possible adverse effects caused by a development, an industrial, or infrastructural project or the release of a substance in the environment.

Evapotranspiration: Discharge of water from the earth's surface to the atmosphere by evaporation from lakes, streams, and soil surfaces and by transpiration from plants.

Gore composting: A comprehensive aerated composting system that employs a cover made of a unique waterproof, breathable laminate technology (Gore TM) to manage moisture content and promote the decomposition of the feedstock.

Green infrastructure: The natural framework and systems that support air quality, water, soil, vegetation and wildlife.

Hazardous tree: A tree that could pose a risk, e.g., because it is diseased or in danger of falling.

Hydrology: The study of water, its composition and properties and, in particular, the place of water in the environment.

Integrated Pest Management: A decision-making process for preventing pest problems and for determining what action to take when pest problems occur. In IPM programs, all available information and treatment methods are considered in order to manage pest populations effectively, economically and in an environmentally sound manner.

International Society of Arboriculture: Through research, technology, and education, the Society promotes the professional practice of arboriculture and fosters a greater worldwide awareness of the benefits of trees.

Landscape Alberta Nursery Trades Association (LANTA):

A voluntary trade association for businesses in the ornamental horticultural industry across Alberta. LANTA members are involved in various sectors of the industry, and the association represents landscape contractors (design, construction, maintenance), arborists, lawn care providers, tree nurseries, garden centres and sod producers.

Native forests: A natural area that is dominated by native trees in naturally occurring patterns.

Natural areas: Land or water dominated by native vegetation in naturally occurring patterns. Such areas could include grasslands, forests, wetlands peat lands or riparian areas. Areas such as groomed parks, sports fields and schoolyards are not natural areas.

Natural Capital: Indispensable resources and benefits, essential for human survival and economic activity, provided by the ecosystem.

Non Government Organization (NGO): A legally constituted organization that operates independently from any government.

Nursery: A place where young trees or other plants are raised for transplanting, for sale or for experimental study.

Objective: Mission, purpose, or standard that can be reasonably achieved within the expected timeframe and with the available resources.

Ornamental / Landscape tree: A tree introduced into the landscape for its visual impact due to aesthetic characteristics such as flowers, texture, form and shape.

Pest: An organism capable of causing material damage. Forest pests include invertebrates, noxious fungi, bacteria and viruses.

Public spaces: Lands held by government organizations for use by the general public. Uses may include athletic, sports and other physical activity as well as historical, natural science, cultural, social and intellectual activities, experiences or programs.

Revegetation: the process of replanting and rebuilding the soil of disturbed land.

Species: A fundamental category of taxonomic classification consisting of related organisms capable of interbreeding and producing fertile offspring.

Stakeholder: Person, group, or organization with direct or indirect stake in an organization because it can affect or be affected by the organization's actions, objectives and policies.

Street Tree Resource Analysis for Urban Forest

Management (STRATUM): Street tree inventory and cost benefit analysis tool developed by the United States Department of Agriculture (USDA) Forest Service.

Tree: a woody perennial plant that grows to a height of at least 4.5 metres.

Tree diversity: A healthy variety of age and species within the urban forest.

Tree inventory: The gathering of accurate information on the health and diversity of a community forest.

Tree preservation: The protection of specific trees or a particular area, group or woodland from intentional damage or destruction.

Tree succession: Predictable and orderly changes in the composition or structure of the ecological community of trees.

Urban forest: The trees and associated vegetation located within city limits, whether planted or naturally occurring. Trees and associated vegetation found in parks, natural/naturalized areas, the river valley, ravines, roadways, private yards, roof tops, commercial and industrial lands are all part of the urban forest.

Urban Forest Effects Model (UFORE): A computer model developed by the United States Department of Agriculture (USDA) Forest Service as part of the i-Tree Software suite that calculates the structure, environmental effects and value of urban forests.

Urban forest sustainability: Management of the urban forest using stewardship principles to meet the social, economic and environmental needs of present and future generations. Special considerations include health and wellness; soil, air and, water quality, and wildlife habitat.

Vision: Aspirational description identifying what an organization would like to achieve or accomplish in the mid- or longer future; serves as a clear guide for choosing current and future courses of action.

Appendix B

Banister Research Survey Results

2009 URBAN FOREST MANAGEMENT PLAN CITIZEN SURVEY

EXECUTIVE SUMMARY

In August 2009, Banister Research & Consulting Inc. (Banister Research) was contracted by the City of Edmonton to conduct the Urban Forest Management Plan Citizen Survey. The intent of the telephone survey was to gather input from City of Edmonton residents regarding their perceptions of the issues surrounding the care of the City's urban forests. A total of 400 surveys were completed, providing results accurate to a +4.9% margin of error, 19 times out of 20.

Key findings of the 2009 City of Edmonton Urban Forest Management Plan Citizen Survey are as follows.

KEY FINDINGS:

AGE OF TREES

- To begin the survey, respondents were asked to estimate the age of the trees in their neighbourhood. Three-quarters (74.5%) of respondents indicated that the trees in their neighbourhood were at least of 20 years of age, while 25.5% reported the trees being less than 20 years old.

IMPORTANCE OF EDMONTON'S TREES

- Respondents were asked to indicate the importance of Edmonton's trees with regards to various aspects, using a scale from 1 to 5 where 1 meant "not at all important" and 5 meant "extremely important." The mean importance ratings of these aspects (out of 5.0) included:
 - For beautification (4.78 out of 5.0);
 - Nature appreciation (4.63);
 - To reduce air pollution (4.55);
 - To promote the well being of Edmonton (4.41);
 - To enhance property values (4.35);
 - To reduce urban environmental footprint (4.31);

- To improve wildlife habitat (4.23);
 - To reduce energy costs through the shading of buildings (4.15);
 - To reduce stormwater runoff (4.13); and
 - To reduce temperature in the city (4.12).
- When respondents were asked if there were any other aspects of Edmonton's trees that were important, the most frequently mentioned aspect was the maintenance of trees (6.5%), while 39.2% of respondents stated there were no other aspects of importance.
 - Two-thirds (65.7%) of respondents indicated the availability of healthy, mature trees was an important aspect (4 or 5 out of 5) when deciding to purchase a home. Twenty-three percent (23.0%) of respondents reported a moderate level of importance while 9.0% indicated a low level of importance (1 or 2 out of 5).

HEALTH OF EDMONTON'S PUBLICLY OWNED TREES

- Next, respondents were asked if they felt that Edmonton's trees were relatively healthy and well cared for. More than three-quarters (78.8%) of respondents stated that Edmonton's trees are relatively healthy and cared for, while 19.0% stated that they were not, and 2.2% of respondents were unable to provide a response.

- Respondents were asked if they lived within a 10 minute walk from a park, natural tree stand or ravine. The majority of respondents (87.5%) indicated they lived within a 10 minute walk from a park, followed by 70.0% of respondents that reported living within this distance of a natural tree stand. Forty-eight percent (48.2%) of respondents stated they resided within a ten minute walk of a ravine.
- When asked to rate the health of trees in their neighbourhood, seventy-nine percent (79.3%) of respondents rated the health of the trees as being healthy (ratings of excellent, very good or good), while 20.0% of respondents reported a low level of health for the trees in their neighbourhood (fair or poor).
- Respondents were asked if there were enough trees in their neighbourhood. Almost three-quarters (73.0%) of respondents reported that there were enough trees, while 26.7% indicated that there were not.
 - Respondents that indicated there were not enough trees in their neighbourhood (n=107) frequently mentioned the lack of trees in the neighbourhood (40.2%), the need for more trees in newly developed areas (14.0%) and a deficiency of mature trees (10.3%).
- Respondents that indicated they were *unaware of City guidelines* regulating the pruning of trees (n=325) were asked to indicate where they would search for this information. The most frequently mentioned sources of information included calling the City of Edmonton (40.6%), followed by contacting the Edmonton Parks Forestry Unit (10.5%).
- When asked if they felt the City provides residents with sufficient information regarding to the care and maintenance of trees in their neighbourhood, 62.0% of respondents indicated that the City did not, while 28.5% reported that the City did provide sufficient information.

GUIDELINES AND POLICIES

- More than two-thirds (68.7%) of respondents supported the City establishing recommendations for proper tree care and management on private property (somewhat or strongly supported), while 15.5% were opposed (somewhat or strongly opposed). Fourteen percent (13.5%) of respondents provided a neutral response, while 2.2% were unsure.
- The majority of respondents (86.7%) supported (somewhat or strongly supported) the City establishing guidelines to make tree preservation a priority in the designs for new subdivisions and in mature neighborhoods, while 3.5% were opposed (somewhat or strongly opposed). Nine percent (8.5%) of respondents provided a neutral response.
- Seventy-nine percent (78.5%) of respondents supported (somewhat or strongly supported) the City establishing guidelines to preserve trees of significance (i.e., unusual species, historical significance, etc.). Ten percent (10%) of respondents were opposed (somewhat or strongly opposed), while nine percent (9.0%) of respondents provided a neutral response.
- Close to three-quarters (73.7%) of respondents supported (somewhat or strongly supported) the City establishing guidelines to protect trees during periods of drought, while 9.8% were opposed (somewhat or strongly opposed). Sixteen percent (16.0%) of respondents provided a neutral response.

MAINTENANCE OF CITY OF EDMONTON PUBLICLY OWNED TREES

- More than two-thirds (68.0%) of respondents rated the maintenance of the trees in their neighbourhood as being of good quality (ratings of excellent, very good or good). Twenty-nine percent (29.0%) of respondents reported a low level of maintenance, while 3.0% were unable to provide a response.
- The majority of respondents (81.3%) were unaware of any City guidelines regulating the pruning of trees in their neighbourhood, while 17.0% of respondents stated that they were aware of these policies.
 - Respondents that indicated they were aware of City guidelines were asked to specify from which sources they received the information (n=68). The most frequently mentioned sources of information included the newspaper (17.6%) and word of mouth (17.6%), followed by television (16.2%).

- Next, respondents were asked if they felt paying \$8.62 per year in taxes to fund the maintenance and care of the city's urban forests is sufficient to ensure the health and vitality of Edmonton's trees. Forty-three percent (43.0%) of respondents indicated that this amount was enough, while 36.5% reported this amount should be increased. Only 1.7% of respondents stated that the amount paid in taxes should be decreased, while 18.7% were unable to provide a response.

SERVICES AND COMMUNICATION WITH THE CITY

- Fifty-nine percent (59.0%) of respondents specified the internet as a method they would prefer for accessing information and services regarding trees in their neighbourhood, followed by 23.5% that cited brochures. Other frequently mentioned methods of communication included television (19.5%), via telephone (18.5%) and by mail (16.5%).
- Lastly, respondents were asked if they would plant a shade tree in their yard to contribute to the urban forest and all its benefits. Three-quarters (74.5%) of respondents indicated that they would plant a shade tree, while 23.0% stated that they would not. Three percent (2.5%) of respondents were unable to provide a response.

2010 STAKEHOLDER WEB SURVEY

Summary of Findings

In June and July of 2010, Banister Research & Consulting Inc. (Banister Research) conducted surveys with the Urban Forest Management Plan (UFMP) stakeholders, including, key stakeholders, academics, institutions, and neighbouring counties. Respondents were asked a series of questions regarding the 2010 UFMP for the City of Edmonton so they could gauge the importance of their plan as well as the extent of their stakeholders' support. Forty-three surveys were completed of which 29 were with key stakeholders, 8 with academics, 3 with institutions, and 3 with neighbouring counties. The results and key findings of the study have been broken down by category within this report as follows:

Importance of UFMP Guiding Principals

First, respondents were informed about the various guiding principles of the UFMP and were then asked to rate the importance of each. These were their responses:

All of the respondents (100%) rated engaging the community in protection and management of the urban forest as important (ratings of 4 or 5 out of 5, one a scale of 1 to 5 where 1 means not at all important and 5 means very important);

Almost all (98%) of the respondents rated promoting a healthy, sustainable urban forest as important;

Ninety-one percent (91%) indicated thinking globally and regionally while planning and acting locally was important; and

Eighty-two percent (82%) indicated that use of the best practices, innovation, etc. was important.

Importance of Outcomes

Next, respondents were asked a series of questions relating to the importance of various outcomes of the UFMP. The responses included:

'Preserving and sustaining Edmonton's environment' was rated important (4 or 5 out of 5) by all respondents (100%);

'Transforming Edmonton's urban form' was rated by 95% of respondents as being important, and

'Improving Edmonton's livability' was rated by 84% of respondents as being important.

Support for Strategy and Action Plans

Respondents were then asked to indicate their level of support for six different UFMP strategies. The results were:

- Eighty-eight percent (88%) of respondents supported pursuing new methods of supplying adequate water;
 - Identifying future resources required to implement the UFMP was also supported by 88% of respondents;
 - Enhancing and strengthening design and development was supported by the majority (88%) of respondents;
 - Instituting best management practices was also supported by 88% of respondents;
 - Seventy-nine percent (79%) of respondents supported developing strategies to reduce the effect of natural disasters; and
 - Seventy-seven percent (77%) supported establishing a 20% tree canopy.
- Eighty-six percent (86%) supported continuing to communicate the benefits of trees;
 - Eighty-four percent (84%) supported increased communication of tree pest issues;
 - Eighty-four percent (84%) supported increased awareness about the benefits of low environmental impact;
 - Eighty-one percent (81%) supported the creation of stewardship opportunities for citizens and their communities;
 - Seventy-nine percent (79%) of respondents supported the City researching best management practices and developing guidelines and public education material; and
 - Eighty-four (84%) supported further enhancing partnerships with post-secondary educational institutions.

Strategy and Action Items

When asked to rate their level of support for various UFMP strategy and action items, the results were as follows:

- Ninety-one percent (91%) of respondents supported (ratings 4 or 5 out of 5, on a scale of 1 to 5 where 1 means do not at all support and 5 means strongly support) the City reviewing models and determining how the urban forest can contribute to decisions about the impact of development impact and ecological network;
- Ninety-one percent (91%) supported continued development of local and regional information sharing;
- Ninety-one percent (91%) supported promotion of long term establishment and health of trees;
- Eighty-eight percent (88%) supported increased urban forest management awareness;

Objectives, Strategies, and Actions of the UFMP

Respondents were given a description of three UFMP objectives and asked to rate the importance of each. The responses included:

- Ninety-five percent (95%) of respondents found providing Edmonton with a comprehensive plan for effective managing, sustaining, and ensuring the impact of important (4 or 5 out of 5).
- Ninety-three percent (93%) found that protecting native forest and tree stands was important; and
- Educating the public, other agencies, neighbouring communities and community partners was rated important by 93% of respondents.

City of Edmonton Urban Forest Management Plan Focus Groups

Banister Research & Consulting Inc. (Banister Research) was contracted by the City of Edmonton to conduct research regarding the importance of trees to Edmontonians, the guiding principles of the Urban Forest Management Plan, and the proposed fiscal management regarding the urban forest.

In order to gain an in-depth perspective on a number of select topics, Banister Research conducted a total of three (3) focus groups with residents on October 13, 2010. Three distinct topics of discussion were developed and explored during the session:

- General thoughts on the urban forest;
- Perceptions of the guiding principles of the Urban Forest Management Plan; and
- Fiscal management with regards to urban forest planning.

This report outlines the findings from the focus groups regarding the City of Edmonton Urban Forest Management Plan.

Overview of Findings

Respondents were asked if they felt that the City needed to communicate about the benefits of trees to citizens. Most respondents felt that these benefits were common knowledge or common sense. With regards to the City's policies regarding trees, most respondents felt that these were not being communicated well enough. They indicated that they only received information when negative events occurred.

When asked about methods of communication, several mentioned that the website was a good tool for looking up information. However, they also suggested ongoing methods for those not actively seeking the information, including; mail-out brochures similar to the ones Waste Management sends, information given with assessments, broadcasting information in the media.

When participants were asked whether or not they thought engaging the community in protection and management of the urban forest was important, the majority agreed that it was. Several respondents stated that it would be good if the City offered tree management services, provided referrals to properly certified tree maintenance companies, or advertised the companies that they hired for City tree maintenance. However, there were limitations to how much they supported this principle. Most respondents did not want legislation of privately owned trees on private property. A few respondents did state that rules on placement were acceptable for matters of public safety - when trees block sidewalks or stop signs, and then need to be removed by the City.

Many respondents felt that education did not need to be continuous, that it should be presented until tree maintenance became common knowledge, or that there should be education and/or information releases on an occasional basis to keep residents up-to-date and inform new residents. Several respondents felt that a website would be a good way to present information, as it is always available and allows people to look at it on their own time. Many also felt that education with children, through the schools, would be a good way to reach young families.

Next, respondents were asked about the balance between public interest and residential property rights and all respondents agreed that this was important to consider.

Many respondents agreed that the City should limit its bylaws regarding what people can do with the trees on their property, stating that people should be allowed to do what they want on the land that they own, and that it's up to them if they want to remove existing trees or plant new ones. A few respondents, however, would accept guidelines and suggestions about what to do with their trees (options other than removing them, trees that might grow better in that area, etc.). When asked, the vast majority of respondents agreed that when a problem such as disease or infestation occurs in a privately owned tree that could affect other private and City-owned trees, the City has a right to deal with it.

All respondents agreed that it was important to encourage space for trees and ensure there is urban forest in new developments. Most respondents felt that there should be rules for land developers with regards to ensuring urban forest is maintained. Many respondents felt that the developers should not be able to shift this responsibility to the residents.

When asked if residents in areas that lack space for publicly owned trees, such as areas without boulevards, should be encouraged (by the City) to plant trees, many respondents agreed. Although most of these respondents felt that encouragement would not include bylaws forcing residents to plant trees.

Participants were next asked if advertising the benefits of the urban forest would encourage people to maintain their trees. Most agreed that it could help people who feel that trees are a nuisance to better appreciate and care for them. If they are aware that the trees improve air and water quality, they will want to maintain them more.

Most stated that they expected the City to diversify the age and species of public tree stands, with a few respondents stating that they should focus on doing it with older and dying trees in the group. Several agreed that if and when they do diversify, signs posted that state the reasons would be beneficial so that people understand the purpose of any removal activities that may be part of the diversification. Most respondents felt that promoting tree diversification on private lands is a good thing for commercial properties. Many also felt that it is important to promote the concept on residential land, with the caveat that people should not be forced to diversify.

Respondents were asked if it was important to keep fiscal limits in mind for future urban forest planning and management. A few respondents stated that while this is important, sometimes it is better to spend more money in the short term, to prevent future increases. Respondents were also asked if more money should be put into forest management during times of severe weather, pest infestation, or disease outbreaks, to which all respondents stated that they should. After being told that the cost per person of forest management was \$8.62, the vast majority agreed that they would be willing to pay more to improve the service they received. A few respondents stated that more money should be portioned to urban forest management from the existing budget.

Appendix C

Using Urban Forest Effects (UFORE) to Model Edmonton's Forest

Urban Forest Effects (UFORE) is a computer program developed by the United States Department of Agriculture (USDA) Forest Service to analyze the urban forest. Part of the i-Tree Software suite, the program combines field observations, meteorological information and pollution data to calculate the forest's environmental effects, structures and value.

In 2009, the City of Edmonton used this model to determine how effectively our urban forest is cleansing air, sequestering carbon and reducing stormwater runoff. From June to September 2009, field observations were recorded at 300 public and private plots throughout the city. The locations were chosen randomly using a Global Information System (GIS) computer program.

In each plot, the following aspects were recorded: percentage and permeability of ground cover (i.e., grass, pavement or disturbed soil), type and size of plant material, percentage of canopy cover and any buildings on the site.

Edmonton is the fifth city in Canada to complete a UFORE analysis.

The model calculates the following:

- urban forest structure, including tree density and species composition and diversity
- hourly pollution removal and the associated improvement in air quality
- the amount of carbon stored and net carbon sequestered per year by the urban forest
- effect of trees on building energy use for heating and cooling and the associated carbon dioxide emissions reductions
- value of the air pollution removal and carbon sequestration

The following tables summarize key results.

Table 1. Value of Pollution Removal in Edmonton (\$)

Pollutants	CO	NO2	O3	PM10	SO2	Total
Month						
January	\$54	\$32,170	\$7,207	\$25,704	\$730	\$65,865
February	\$101	\$28,361	\$9,288	\$29,731	\$585	\$68,067
March	\$92	\$30,995	\$28,161	\$34,264	\$597	\$94,109
April	\$103	\$22,762	\$47,819	\$65,638	\$302	\$136,625
May	\$1,100	\$60,319	\$379,249	\$80,145	\$1,549	\$522,362
June	\$1,398	\$81,484	\$444,952	\$101,782	\$2,643	\$632,259
July	\$1,276	\$74,569	\$344,652	\$96,406	\$10,066	\$526,970
August	\$1,316	\$86,806	\$384,471	\$117,930	\$3,167	\$593,689
September	\$164	\$19,758	\$29,675	\$83,570	\$782	\$133,949
October	\$87	\$24,260	\$21,670	\$100,731	\$450	\$147,199
November	\$88	\$24,924	\$14,891	\$58,058	\$796	\$98,756
December	\$44	\$26,300	\$4,638	\$25,784	\$184	\$56,950
Total	\$5,824	\$512,709	\$1,716,673	\$819,744	\$21,850	\$3,076,800

Table 2. Amount of Pollution Removal in Edmonton (metric ton)

Pollutants	CO	NO2	O3	PM10	SO2	Total
Month						
January	0.06	4.76	1.07	5.70	0.44	12.03
February	0.11	4.20	1.38	6.60	0.35	12.63
March	0.10	4.59	4.17	7.60	0.36	16.82
April	0.11	3.37	7.08	14.56	0.18	25.30
May	1.15	8.93	56.17	17.78	0.94	84.96
June	1.46	12.07	65.90	22.58	1.60	103.60
July	1.33	11.04	51.04	21.39	6.09	90.89
August	1.37	12.86	56.94	26.16	1.92	99.25
September	0.17	2.93	4.40	18.54	0.47	26.50
October	0.09	3.59	3.21	22.34	0.27	29.51
November	0.09	3.69	2.21	12.88	0.48	19.35
December	0.05	3.90	0.69	5.72	0.11	10.46
Total	6.07	75.93	254.25	181.84	13.22	531.31

Appendix D

Public Tree Benefits Quantified by Species

Annual benefits and net benefit of the average tree in Edmonton's Urban Forest, calculated using Street Tree Resource Analysis for Urban Forest Managers (STRATUM), November 2009.

Annual Benefits of Public Trees by Species (\$/tree)							
Date April 24, 2012							
Species	Common Name	Energy	CO2	Air Quality	Stormwater	Aesthetic/Other	Total
Acer negundo	Manitoba Maple	17.93	3.57	2.58	17.21	127.43	168.72
Populus balsamifera	Balsam poplar	13.69	2.69	1.67	12.73	122.31	153.07
Ulmus americana	American elm	15.17	2.93	2.19	13.08	116.67	150.04
Populus x jackii 'Northwest'	Northwest poplar	13.72	2.72	1.78	12.84	115.50	146.56
Fraxinus pennsylvanica	Green ash	10.40	2.05	1.21	9.48	102.96	126.10
Tilia species	Linden	8.56	1.67	0.96	8.03	95.57	114.79
Larix species	Tamarack	6.38	1.24	0.59	5.79	86.13	100.12
Picea glauca	White spruce	6.60	1.24	- 0.49	15.15	67.01	89.52
Picea pungens	Blue spruce	5.35	1.04	- 0.40	12.25	63.53	81.77
Populus species	Swedish columnar aspen	4.10	0.80	0.33	3.64	69.58	78.46
Pinus sylvestris	Scotch pine	3.76	0.55	- 0.05	9.17	47.31	60.73
Pinus contorta	Lodgepole pine latifolia	3.43	0.50	- 0.06	8.37	46.06	58.30
Pinus mugo	Mugo pine	3.83	0.54	- 0.50	7.70	43.86	55.42
Prunus padus	Mayday	5.10	1.06	0.93	2.66	40.51	50.26
Acer ginnala	Amur maple	4.25	0.88	0.72	2.16	36.52	44.53
Malus species	Crabapple	3.11	0.68	0.44	1.58	32.80	38.62
Prunus virginiana	Common chokecherry	2.30	0.52	0.23	1.12	28.90	33.08
Quercus macrocarpa	Bur oak	2.24	0.48	- 0.14	1.92	25.72	30.22
Other street trees	Other street trees	7.79	1.45	0.74	8.93	77.02	95.92
Average benefit /tree	88.22						
Civic budget per tree	23.78						
Net benefit per tree	64.44						

Appendix E

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