



NATIONAL CAPITAL COMMISSION
COMMISSION DE LA CAPITALE NATIONALE

Forest Strategy

2021–2026

Canada

Table of Contents

Introduction	1
The Importance of Trees and Forests	3
Connection to Prosperity: Economic Benefits	4
Connection to Nature: Environmental Benefits	5
Connection to Health and Well-Being: Social Benefits	6
Connection to Place and History: Cultural Benefits	7
Trends Affecting Our Trees and Forests	8
Urban Development	9
Climate Change	10
Tree Species Diversity	11
Invasive Species	12
Safety Risks to the Public	12
Distribution of Canopy Cover	13
How Much Forest Does the NCC Manage, and How Is It Distributed?	14
How the NCC Currently Manages Trees and Forests	16
Partnership Feature Stories	19
The NCC's Five-Year Action Plan , 2021–2026	20
Understand Our Trees and Forests	22
Protect Existing Canopy Cover	22
Plant the Right Trees in the Right Place	22
Manage for Resilience, Safety and Efficiency	23
Engage With Partners and the Community	23
The NCC's Tree Planting Targets	24
Next Steps	24
Stay Connected	25
References	26



Introduction

Staghorn sumac



The purpose of the Forest Strategy is to provide a blueprint that guides tree and forest management on lands managed by the National Capital Commission (NCC). This strategy is needed, because the trees and forests of the National Capital Region provide important services and are essential to the perception of Canada's Capital as a scenic and natural place. At the same time, trees and forests in the Capital Region face many pressures that must be managed. These include lack of species diversity, invasive pests and disease, urban development and climate change. Within an urban setting, factors such as equitable access to urban parks, woodlands and forests, as well as safety risks to the public must be considered.

Through this strategy, the NCC is articulating its goals in terms of how trees and forests will be managed over the next 30 years. In addition to a long-term vision, goals and objectives, the strategy contains a five-year action plan designed to increase the NCC's capacity to effectively manage this important natural infrastructure. The Forest Strategy also identifies the NCC's planting targets, and encourages collaboration with regional partners, particularly the City of Ottawa and Ville de Gatineau, as well as the municipalities of Chelsea, La Pêche and Pontiac.

Much of the land under the NCC's care is green space, and much of it is in its natural state. The NCC conserves and protects over 55,000 hectares of federal lands within the National Capital Region, over 70 percent of which is forested. Although the scope of the Forest Strategy includes large tracts of natural forested areas like Gatineau Park and the Greenbelt, the strategy has a strong emphasis on urban areas, and considers the management of individual trees, as well as forested and semi-forested areas such as woodlands and parks. It also includes forests in peri-urban and urban areas, such as woodlands and parks, parkways, pathways, riparian buffer strips, agricultural hedgerows, farm lanes, street trees along boulevards (e.g. Confederation Boulevard), and natural forests. Trees and forested areas managed by the City of Ottawa, the Ville de Gatineau or private landowners are not included.

INDIGENOUS PEOPLES AND THE CAPITAL

The NCC acknowledges that the National Capital Region, in which it carries out its mandate, is situated on the ancestral lands of the Algonquin Anishinabe Nation. The NCC values Indigenous heritage and knowledge, and commits to continue working collaboratively with the Anishinabe Nation, as well as with other Indigenous communities, to build a sustainable Capital Region.



The Importance of Trees and Forests

Maple / Ininatig



Staghorn sumac

Trees are more than just a pretty landscape feature; they provide many economic, environmental, social and cultural benefits that make cities healthy and vibrant places to live.

Connection to Prosperity: **Economic Benefits***

Trees and forests provide many traditional economic benefits. The ecosystem services (i.e. the benefits people derive from ecosystems) that these lands provide represent important benefits that are not measured according to traditional market metrics. These benefits include air quality control, water filtration, climate regulation, carbon storage, wildlife habitat and erosion control.

Providing valuable ecosystem services	The NCC’s study on natural capital analyzed the value of different ecosystem types found on NCC lands. The total economic value of the services provided by urban and rural forest ecosystems amounts to \$174 million per year. Urban forests have a significantly higher value per hectare per year than rural forests, due to the relative scarcity of trees and forests in urban areas compared with rural areas. The value of pollination within the NCC’s urban and rural forests is estimated to be \$31 per hectare per year. A New York study found that its urban forest removed 1,821 metric tonnes of air pollution, at an estimated societal value of \$9.3 million annually. ¹
Reducing energy costs	Restoring natural systems is often more cost-effective than technological alternatives or building new infrastructure. Major economic benefits come through shading buildings in summer, which reduces the cost of energy used for air conditioning.
Increasing property values	Street trees enhance neighbourhood aesthetics and are proven to increase property values. It is estimated that properties on tree-lined streets are valued around 30 percent higher than those in treeless streets. ²
Decreasing health costs	Research demonstrates that there are health benefits from trees and forests. ³ While it is difficult to quantify dollar savings, contact with green spaces such as urban trees and forests likely reduce health costs associated with sedentary behaviour, obesity and mental illness.
Marketing Canada’s Capital Region	Green spaces play a role in defining the culture and image of a city. A better image makes a city more competitive, thus expanding its economic influence.
Boosting business	Research has shown that nature can boost the viability of businesses by drawing shoppers into business districts and encouraging them to spend more: U.S. research found that customers prefer shopping on well-tended streets with large trees. The study also found that they would pay 9 to 12 percent more for goods sold in central business districts with a high-quality tree canopy, and would travel further, visit more often, pay more for parking and stay longer in a shopping district with plenty of trees. ⁴

**Some of the information in this section is adapted from How to Grow an Urban Forest, by the City of Melbourne and the Victoria State Government (2015).*



Connection to Nature: Environmental Benefits

Forests and trees play an essential role in moderating stormwater runoff and flooding, water quality, and erosion, and help keep cities cool, sequester carbon and provide wildlife habitat.

Providing shade and cooling our cities	Trees cool the air by releasing water vapour during a process called transpiration. The shade provided by trees on hot summer days helps to reduce localized temperatures by up to 12 degrees Celsius. ^{5,6} Urban trees have a better ability to provide relief from heat compared with artificial shade structures or open green spaces. ⁷ A tree can be a natural air conditioner: the evaporation from a single tree can produce the cooling effect of 10 room-size air conditioners operating 20 hours a day. ⁸
Reducing stormwater flows, erosion and nutrient loads	Tree roots retain rainwater, and reduce and delay runoff, resulting in decreased stress on sewer systems and rivers at peak flow periods. It is estimated that, for every 5 percent increase in overall canopy cover, total city runoff is reduced by 2 percent. ⁹ In Halifax, it is estimated that street trees provide about \$2.1 million in stormwater reduction services annually. ¹⁰ Healthy tree roots help reduce the nitrogen, phosphorus and heavy metal content in stormwater; keep soil healthy through nutrient cycling; and help manage erosion by stabilizing steep slopes.
Reducing air pollution and airborne particulates	<p>Breathing air pollution can lead to a wide range of health impacts that include fatigue, headaches, worsening of asthma symptoms, allergies, chronic pulmonary disease, certain cancers, heart attack, stroke and other cardiovascular diseases.¹¹ Outdoor air quality is expected to decline with climate change due to higher levels of ground-level ozone and airborne dust (including smoke from wildfires), as well as increased production of pollens and spores by plants, and the burning of fossil fuels.¹²</p> <p>Trees in natural environments and green spaces help capture and/or filter air pollution by removing ozone, fine particulate matter, nitrogen dioxide, sulphur dioxide, carbon monoxide, cadmium, chromium, nickel and lead through their leaves. Research showed that a 10-square-kilometre area with a 25 percent tree cover has the potential to remove 90.4 tonnes of particulate matter, which could prevent two deaths and two hospitalizations per year.¹³</p>
Storing and sequestering carbon	Trees store carbon dioxide (CO ₂), and carbon storage is considered a key mitigation strategy for reducing levels of atmospheric CO ₂ . The amount of CO ₂ stored on NCC lands is estimated at approximately 32 million tonnes, given a forest area of about 40,000 hectares. It is estimated that forests on NCC lands sequester approximately 77,200 tonnes of CO ₂ annually. ¹⁴
Supporting biodiversity and habitat	The forest and urban trees are the foundation of the National Capital Region's ecological network. Even urban forests provide important habitat, and support a wide range of resident and migratory species of wildlife, as well as hundreds of native plant species. Several plant and animal species at risk can also be found on NCC lands, such as butternut trees, the Canada warbler and western chorus frog.



American beech / Ajaweminj

Connection to Health and Well-Being: Social Benefits

Forests have a large range of positive impacts on the community, by forming shared points of orientation and allowing daily interaction with nature that results in multiple health benefits.

Encouraging outdoor activity	Research has shown that trees enhance the quality of parks and outdoor spaces, and encourage physical activity. ¹⁵ People are more likely to walk to get their coffee or do errands when there are trees or other natural features along the route. People who use parks and open spaces are three times as likely to reach recommended levels of physical activity, reducing their health risks. ¹⁶
Reconnecting children with nature	Studies have shown that green spaces allow creativity, encourage exploration and adventure, promote physical activity, build resilience, and enhance experiential learnings. ¹⁷ Children who are active in nature have been shown to perform better on tests. ¹⁸
Reducing people’s exposure to sun	Overexposure to the ultraviolet (UV) radiation in sunlight increases the risk of skin diseases. Socially vulnerable communities and children are more at risk from extreme heat and UV exposure. The shade provided by trees has been proven to provide UV protection.
Reducing heat-related illnesses	Ongoing exposure to high temperatures and humidity can create health risks where sources of relief (e.g. air conditioning, cool breezes, trees) are not available. Each year in Ottawa, there are approximately 86 emergency room visits directly related to exposure to extreme heat, such as heat exhaustion and heat stroke. ¹⁹ Health Canada estimates that current heat-related mortality rates could nearly triple between 2021 and 2050, increasing by over sixfold between 2051 and 2080. ²⁰ Research has shown that a 20 percent increase in a city’s urban forest canopy can reduce ambient temperatures by 3 to 4 degrees Celsius. ²¹
Improving mental well-being	Access to, and views of, green spaces and trees have positive effects on people’s well-being: the more time spent in green spaces, the greater the restorative effect and lower the stress levels. Studies have found that surgical patients who had a view of trees from their rooms had shorter stays in hospitals, ²² and children with Attention Deficit Disorder have less severe symptoms after participating in activities in green settings. ²³ Urban trees are also effective noise buffers, which can reduce stress levels. Living near urban green space can lead to more time spent outside and better self-reported mental and physical health. For example, dementia patients exposed to nature are calmer. ²⁴



Sugar maple / Sizibakwado-ininatig

Connection to Place and History: Cultural Benefits

Trees and forests can connect us with our past, whether it's to a place, person, historical event or a significant horticultural tradition. They also shape our present understanding of our communities.

Providing a sense of place and creating local identity	Trees and forests are an essential part of the identity of the National Capital Region. The character of the Capital's landscape has been shaped by approximately 120 years of landscape architecture, and is influenced by its streets and parks accented with big trees and lush vegetation, as well as by the iconic natural forests of Gatineau Park and the Greenbelt.
Connecting to Algonquin culture	For the Algonquin Anishinabe Nation, whose ancestral territory includes the National Capital Region, the canoe is a fitting symbol of the cultural importance of trees and forests to the Algonquin people. Algonquin canoes are made from five kinds of trees found on NCC-managed lands: white birch (<i>Wigwas</i> , <i>Betula papyrifera</i>) is used for the exterior, eastern white cedar (<i>Wabino-kijik</i> / <i>Kijik</i> , <i>Thuja occidentalis</i>) is used to make the frame, American basswood (<i>Wigobimij</i> , <i>Tilia americana</i>) bark is used to tie different pieces together, roots of white spruce trees (<i>Minahig</i> , <i>Picea glauca</i>) are used to sew the birchbark together, and the spruce sap used to make the seams watertight is applied with a brush made from black ash (<i>Makadenagimak</i> , <i>Fraxinus nigra</i>). ²⁵ The photo on the following page shows a local Algonquin elder making a canoe in the traditional way.
Connecting with Canadian history	As part of the nation's capital, the trees and forests managed by the NCC remind citizens and visitors of important chapters of the Capital's history. Owing to age or location, heritage trees and landscapes associated with properties such as Rideau Hall, Confederation Park, Confederation Boulevard, the Mackenzie King Estate, Major's Hill Park and Rideau Canal pathways stand as a testimony to the Capital's cultural and historical heritage and identity.



Trends Affecting Our Trees and Forests



Urban Development

As the National Capital Region grows and urban density increases, trees are sometimes cut down as part of new developments. However, new trees must be planted to replace them. Determining appropriate compensation measures is complex, and depends on the context, such as the location, age and size of the trees that are cut down, as well as the importance of trees at the particular site (e.g. trees located in forested areas versus urban environments), the relative impact of the anticipated loss of ecological functions, and so on.

As urban density increases, the extent of hard surfaces, including native soils compacted during construction activities, increases, and less water can permeate down into the soil. The resulting increase in surface water runoff can impact water quality, soil moisture and flood risk, which further impact natural ecosystems and infrastructure.

Increased density of development and utility infrastructure, both under and above ground, can result in less area for tree root and/or canopy growth and stress for nearby trees. Increased salt levels in the soils of urban areas as a result of de-icing roads in winter months cause dehydration in trees. The use of lime-based aggregate in sidewalks, roads and paths in urban areas leads to increased soil pH levels. These kinds of conditions increase the impacts on ecosystems and decrease their resilience to threats.

Successful urban trees thrive in modified urban soils, and tolerate higher levels of pollution, pruning, compaction and numerous other activities associated with urban land uses. Although native species are generally preferred, non-native trees may be planted in certain circumstances, for example, in ornamental or formal landscapes, and where non-native alternatives offer a significantly better likelihood of survival, given conditions specific to the planting location (e.g. impacted street trees). However, planting the right tree in the right place — where it can thrive — is as important as selecting hardy species. Planting a wide variety of species with different functional traits, as well as intelligently planning the placement of these species is another way to increase the resilience of the urban forest.

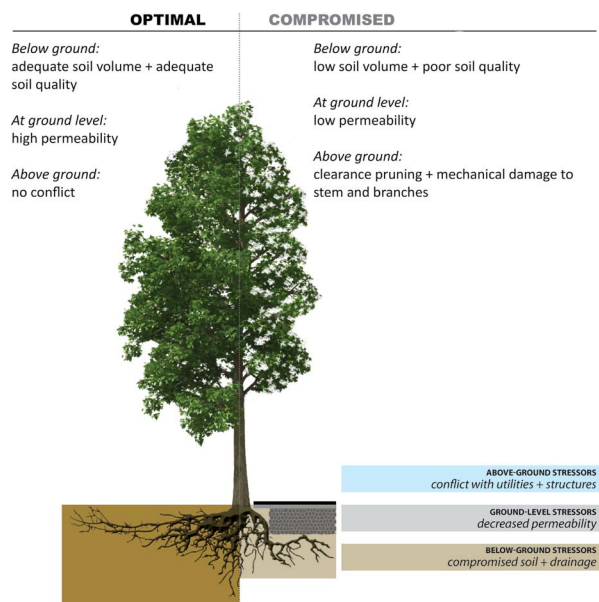


Figure 1. Trees in urban environments often face continuous stress as a result of compromised growing environments.
Source: Diamond Head Consulting

Climate Change

In 2019, the NCC commissioned a study, *Climate Projections for the National Capital Region*, to develop climate change projections for the National Capital Region. The key findings of this study are summarized in Figure 2. Improving the level of understanding about climate change will help to guide the NCC's decisions concerning tree and forest management.

Although the exact impacts of climate change on the NCC's forests cannot be forecasted with 100 percent precision, certain management implications and related effects on resources can be anticipated from climate projections. These include the following:

- increased operating resources (or dedicated reserve funds) to deal with extreme weather events, storm and fire response, flooding, fire prevention, and planting;
- expanded forest health monitoring, inventory, forecasting and control programs in response to new insect pests and diseases;
- increased need for watering and maintenance of drought and heat-stressed trees in urban areas due to abiotic stresses under a changing climate; and
- expanded education and emergency planning.

The urban heat island effect is likely to worsen under future climate conditions. Periods of prolonged heat exacerbate heat stress, particularly for priority populations such as people who are experiencing homelessness and those who are underhoused, older adults, infants and children, and people with pre-existing medical conditions. Healthy urban forest canopy cover and moist soils in hot spots will create continuous cool refuges across the region to reduce people's vulnerability during heat waves, and lower building energy consumption (see Figure 3).

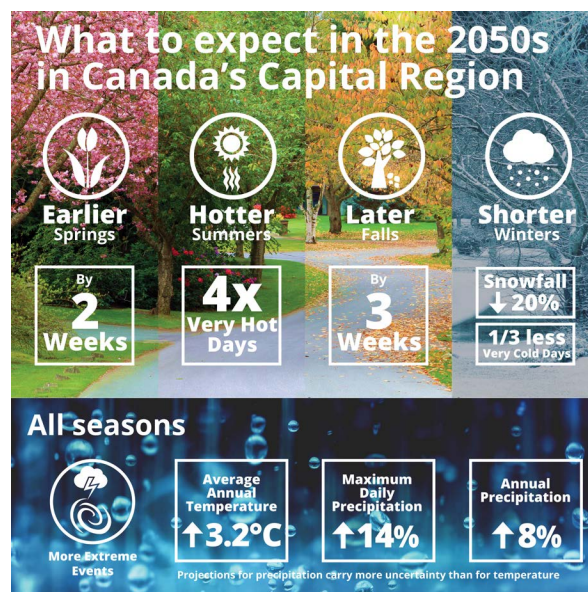


Figure 2. Some of the changes that the National Capital Region is predicted to experience by the 2050s under a high carbon-emission scenario.

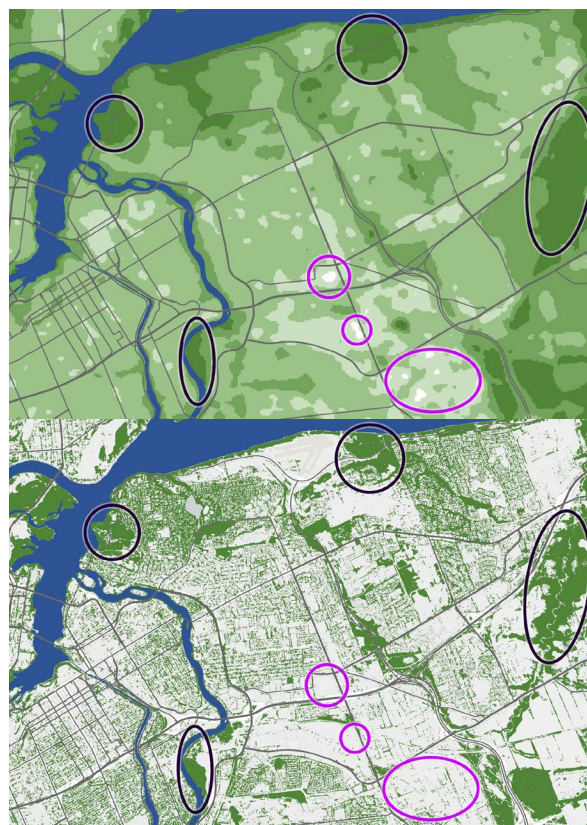


Figure 3. Top: Urban heat map showing hot areas (light purple circles) and cool areas (black circles) in central and eastern Ottawa (July 18, 2019, Environment and Climate Change Canada). Bottom: Tree canopy cover showing corresponding absence of trees (light purple circles) and presence of trees (black circles) (2017, University of Vermont).



Tree Species Diversity

Biodiversity is inextricably linked to the resilience of ecosystems, and reliance on a few species is risky. A lack of species diversity leaves the urban forest more vulnerable to threats from pests, disease and stress due to climate change. Typical urban forests and streetscapes, including those of the National Capital Region, are still dominated by a few individual species and cultivars; most neighbourhoods are now dominated by the Aceraceae (maple) family. Having an insufficiently diverse species profile creates the potential for widespread and rapid tree mortality which may occur in the event of the introduction of a destructive pest or disease (e.g. Dutch elm disease and emerald ash borer).

Although species diversity is important, diversity at the genus or family level can be more important in reducing the vulnerability to pests and diseases. A common rule for achieving a target diversity level suggests planting no more than 10 percent of any species, 20 percent of any genus or 30 percent of any family²⁶ within an area. Although some data about the species diversity of the NCC's urban tree population exist, a robust inventory of species diversity has not yet been developed.

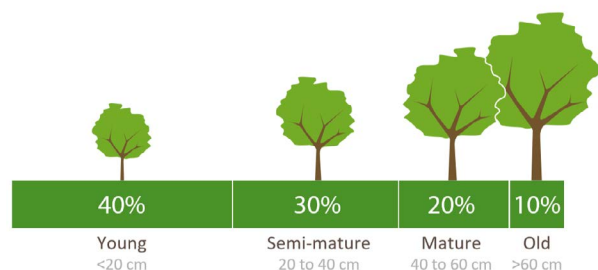


Figure 4. “Richard’s Rule” on tree age diversity. Using size (diameter at breast height, or DBH) as a proxy for age, the 40:30:20:10 guideline suggests urban tree populations should have the distribution shown here. Source: Diamond Head Consulting

Age and size diversity are important for maintaining a relatively stable forest population over time — a uniform age profile makes it likely that many trees will decline and die at the same time. An aging tree population requires increasing resources to manage and sustain. A high proportion of over-mature trees carries an element of public risk and cost, and must be managed accordingly. Using size as a proxy for age, the 40:30:20:10 guideline²⁷ suggests urban tree populations should have the distribution shown in Figure 4. As is the case with data about species diversity, some data about the age diversity of the NCC’s urban tree population do exist. However, a solid inventory of tree ages and sizes has yet to be developed.

Genetic diversity is also important for having resilient individuals in the tree population, and for genetic conservation of diversity within tree species. The genetic diversity of the NCC’s urban tree population is unknown. However, it is potentially declining in urban areas, because modern nursery practices rely on industrial-scale production of clonal trees. As cloned trees are genetically identical, stands of clones are highly vulnerable to threats from insects and disease. Also, the selection of clones from the same climate zone further increases vulnerability. Climate change will alter local growing conditions, and sourcing seeds from more southern regions could be one adaptation strategy. Increasing genetic diversity within the NCC’s urban and rural green spaces and forests over the long term will need to be coordinated with the nursery industry that supplies the tree stock.



Figure 5. Damage caused by emerald ash borer.

Invasive Species

Invasive species pose a significant threat to the native biodiversity of many parts of eastern Ontario and western Quebec, impacting a wide range of ecological functions in the areas where they occur.

The following are examples of significant losses to native forest diversity due to introduced pest species:

- losses of ash species (*Agimak*, *Agrilus planipennis*) to emerald ash borer (Figure 5)
- losses of American elm, slippery elm and rock elm (*Anib*, *Ulmus rubra*, *Ulmus thomasi*) to Dutch elm disease
- losses of butternut (*Paganakominaganj*, *Juglans cinerea*) to invasive fungal disease.

On the forest floor, garlic mustard (*Alliaria petiolata*), dog-strangling vine (*Vincetoxicum rossicum*), Japanese knotweed (*Reynoutria japonica*) and European buckthorn (*Rhamnus cathartica*) are examples of species that continue to reduce the space available for native species in urban forests. Because pest infestations often spread across political boundaries, it is important to maintain partnerships with other organizations, including the Ville de Gatineau, the City of Ottawa, conservation authorities, the Ontario Ministry of Natural Resources and Forestry, the Ministère de l'Environnement et de la Lutte contre les changements climatiques du Québec, and the Ministère des Forêts, de la Faune et des Parcs du Québec.

Safety Risks to the Public

Trees in urban areas generally have different maintenance requirements than do trees in natural areas. Maintaining these trees in a safe and healthy condition is an ongoing concern for the NCC. Maintenance for public safety involves a wide range of activities, which include the following:

- maintenance pruning of street and park trees and trees along some pathways to eliminate dead or hazardous limbs or branches that pose a risk to visitors;
- maintenance and/or removal of branches and trees that impact infrastructure;
- control of invasive species and noxious weeds;
- removal of dead trees or trees that can no longer be maintained in a safe condition;
- cleanup of failed tree limbs and other tree debris following severe weather;
- maintenance of young trees to support proper establishment through structural pruning, watering and mulching; and
- seeking mitigation measures tailored to the site to manage identified risks, while making every effort to preserve urban trees (e.g. pruning, cabling, retrenchment for veteran trees, improving root zones via decompaction activities).



Distribution of Canopy Cover

Linking tree canopy data with socio-demographic information can help highlight areas where inequities may be present. For example, studies suggest that areas with lower income also have lower tree canopy cover.^{28,29,30}

A recent study found that many of the most vulnerable residents of Montréal are exposed to relatively significant urban heat islands.³¹ Areas with high proportions of people who are at risk during an extreme heat event are often located close to industrial and commercial areas where severe urban heat islands occur.

In its [2019 tree canopy assessment](#), the NCC explored the relationship between tree canopy and two variables from Statistics Canada: median income and population density. As shown in Figure 6, a statistically significant relationship exists between median income and the percentage of tree canopy in the National Capital Region, meaning that wealthier areas tend to have greater amounts of tree canopy. This relationship does not always hold, as evident in some lower-income rural areas with large amounts of tree canopy, and wealthy downtown areas with lesser amounts of tree canopy.

A statistically significant inverse relationship exists between tree canopy and population density (see Figure 7). Despite this relationship, there are highly populated areas that have relatively high percentages of tree canopy due to the presence of urban forests.

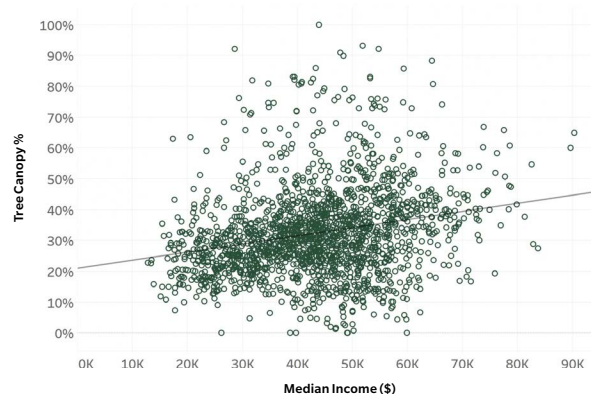


Figure 6. Relationship between tree canopy cover and median income (Tree Canopy Assessment of Canada's Capital Region, University of Vermont, 2019)

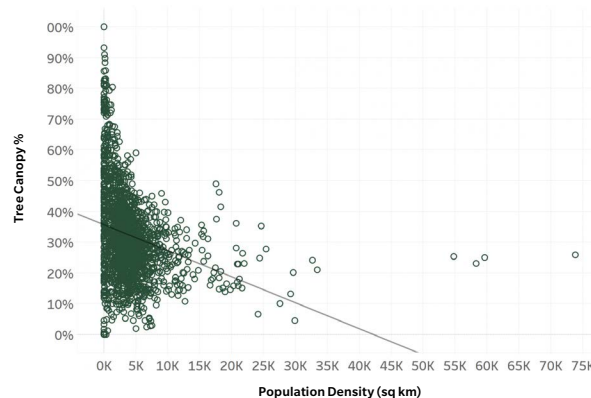
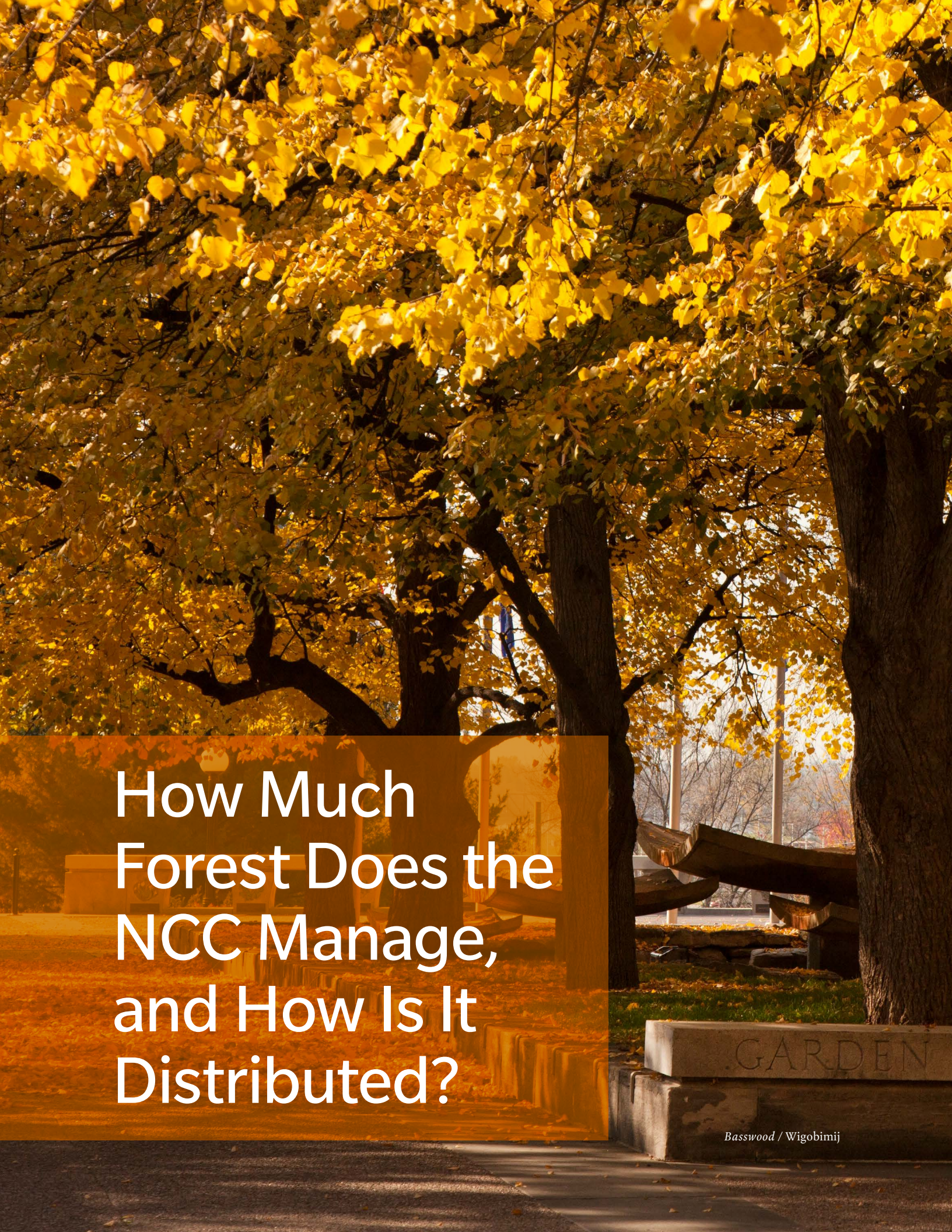


Figure 7. Relationship between the tree canopy cover and population density (Tree Canopy Assessment of Canada's Capital Region, University of Vermont, 2019)



How Much Forest Does the NCC Manage, and How Is It Distributed?

Basswood / Wigobimij

In 2019, the NCC worked collaboratively with the City of Ottawa, Ville de Gatineau and University of Vermont Spatial Analysis Laboratory to develop a high-quality canopy cover assessment for the year 2017.

Using geographic information systems (GIS), the tree canopy within the boundaries of the City of Ottawa and Ville de Gatineau, and the lands managed by the NCC has been summarized at various geographical units of analysis, ranging from the regional boundary to neighbourhoods. This study enabled mapping of the tree canopy in detail over 1,000 times greater than ever before. From the street tree in an Ottawa suburb to old-growth trees in the forests of Gatineau Park, every tree over two metres tall in the Capital Region was accounted for.

About 74 percent of the lands managed by the NCC are covered by trees and forests. Gatineau Park alone contributes over 30,000 hectares of tree canopy, and the Greenbelt contributes about 7,000 hectares. Although the urban areas managed by the NCC have considerably less total tree canopy compared with Gatineau Park, they have a higher-than-average percentage of tree canopy compared with the National Capital Region as a whole, because of the large amount of green space managed by the NCC.

The quantity of canopy cover is an important metric in forest management. However, the quality of the canopy is also important. For example, the canopy cover assessment measured trees taller than two metres but did not discriminate among different species. Therefore, the canopy cover total includes large specimens of buckthorn, an invasive species, and potentially other invasive or non-native species. These species may have value as a part of the canopy cover, but are undesirable in terms of the quality of forest composition.

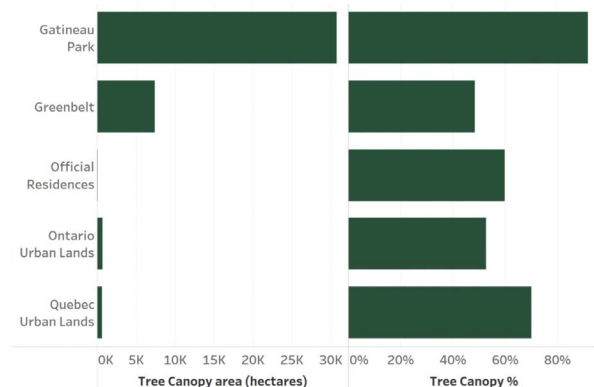


Figure 8. Tree canopy metrics summarized by NCC portfolio. (Tree Canopy Assessment of Canada's Capital Region, University of Vermont, 2019)



Photo: John Cree



How the NCC Currently Manages Trees and Forests

As per the Gatineau Park, Greenbelt, Capital urban lands and the Capital core area long-range plans, the management of trees and forests is not the same across all NCC portfolios.

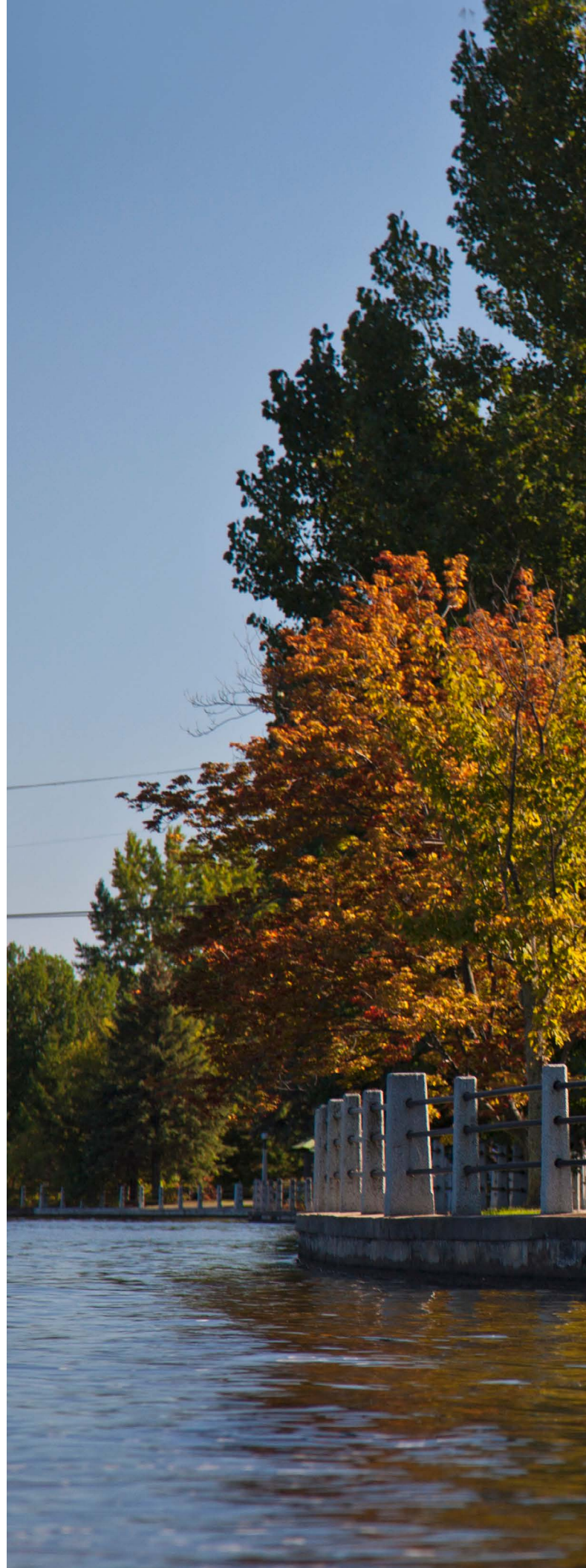
Gatineau Park is managed as an International Union for Conservation of Nature (IUCN) category II protected area. Thus, ecosystems are managed to allow natural processes, and protect biodiversity and species at risk. Few interventions are aimed at the forest or trees, except for the restoration of certain areas and maintenance to ensure safety.

In the Greenbelt, the approach to managing trees and forests is based on mitigating risks by assessing stand health, especially at the edges of trails. Improving biodiversity throughout the Greenbelt lands, and therefore the biodiversity of forested areas, is a high priority. The leased lands portfolio promotes sustainable agriculture practices in the Greenbelt, such as encouraging the planting and preservation of hedgerows and shelterbelts.

The NCC's urban lands comprise commercial and residential properties, recreational areas, parkways, parking lots, picnic areas, trails, conservation areas, and natural areas. The overarching policy intent for green spaces on urban lands prioritizes environmental stewardship. Capital parks are popular sites for major events, and will require guidelines to address intensive use and avoid degradation of natural features.

The presence of Dutch elm disease and emerald ash borer has had a significant impact on the quality of urban woodlots. Since 2010, the NCC has cut more than 56,000 infested ash trees. Forest management efforts have been focused on the removal of dead trees in locations of highest human use, treatment of invasive plants in the forest understorey and replanting.

Since 2014, the NCC has planted approximately 20,000 trees and shrubs to partially offset tree loss due to natural mortality, invasive pests, climate change impacts, urban pressures and so on.





As part of its mandate, and in compliance with environmental laws, the NCC reviews development projects on federal lands. When work is proposed on NCC-managed lands, it is reviewed under a federal approval, land access permit, event permit or maintenance contract. The proponent and/or contractor is required to identify the location, species and diameter at breast height (DBH) of all trees over 10 cm DBH that may be affected by works, implement mitigation measures, and reinstate and/or improve landscapes that are affected or altered. The NCC ensures that high-quality landscape plans are developed for areas affected by construction projects. Proponents are required to maintain, water and protect all plantings implemented as a result of compensatory or mitigation measures to ensure that new trees are successfully established.

Despite this, it is not always possible to ensure an immediate reinstatement of the original landscape condition. Trees planted as replacements for those removed are typically smaller and may take years to become established and provide the same social, aesthetic and ecological benefits. The success of landscape restoration can also be impeded by construction-related soil compaction and the introduction of invasive species, which compete more readily with new plantings in disturbed locations. Trees removed are often replaced at a minimum 2:1 ratio (two trees planted for each tree removed) in an attempt to overcome these obstacles. However, for mature trees, a higher ratio than 2:1 or a monetary value may be sought to compensate for the loss of exponentially greater benefits provided by large, old trees compared with small ones. A 2:1 ratio is generally considered to be too low and revising our approach to compensation is a priority action in this strategy.

The NCC is currently steward to many cultural landscapes of varying typologies and scales, which include parks, estates and parkways. To inform the management of cultural landscapes, the NCC has developed tools such as the *Guidelines to the Management and Maintenance of Mackenzie King Estate as a Cultural Landscape* (2014) and the *Rideau Hall Landscape Design and Site Management Guidelines* (2005). These tools ensure that landscape elements such as trees, landforms and other vegetation are conserved for generations to come. In recognition of the value of large, old trees, the NCC has released a book authored by Suzanne Hardy, entitled *[A Living Legacy: Remarkable Trees of Canada's Capital](#)*, which is a compilation of photos and information about 168 noteworthy trees in the National Capital Region.

Partnership Feature Stories

In October 2019, the NCC and Collège La Cité signed a three-year memorandum of understanding. This partnership was established with the objective of improving the health of our urban forest, as well as improving the applied knowledge of students in forestry and arboriculture. The activities are planned according to the needs of the NCC, as well as the needs of the teachers, based on the curriculum for each class.

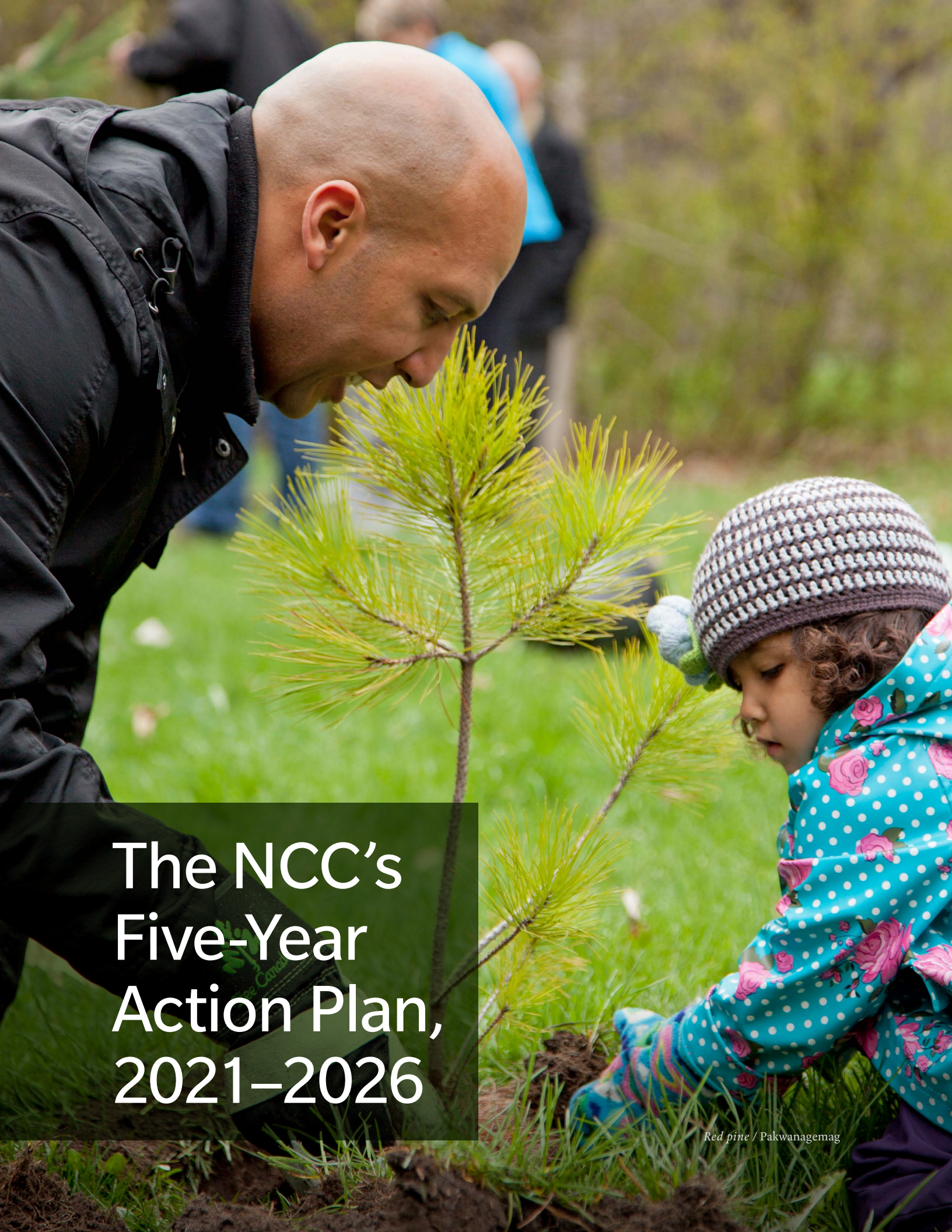
Since the spring of 2016, hundreds of volunteers, including students from Regina Street Alternative School in Ottawa, and NCC staff have manually removed several invasive alien species around Mud Lake. In spring 2018, the school partnered with the NCC to monitor a revegetation project in the western planted area of Mud Lake, and acted as environmental stewards for the Mud Lake forest. The students laid down coconut mats around tree bases, monitored growth by measuring trees/shrubs, participated in a tree and shrub species identification activity, and removed invasive garlic mustard from the planting area.

The Conseil régional de l'environnement et du développement durable de l'Outaouais (CREDDO) launched the Airouvert tree-planting initiative in 2017, which aims to green urban areas in Gatineau. The NCC is represented on the advisory committee of this initiative, and has been recording the number of trees planted on NCC lands, contributing to increasing the forest cover in the region.

The City of Ottawa and Ville de Gatineau have numerous forest-related strategies, policies and initiatives and, through this strategy, the NCC is taking a step toward greater alignment with its regional partners. The NCC already collaborates with the City of Ottawa and Ville de Gatineau on forest-related initiatives. For example, the NCC partnered with both cities to complete the 2019 tree canopy assessment, which will allow the three partners to set planting targets and locate areas for planting.

In collaboration with the Friends of Gatineau Park, the Citizen Science Program was developed and launched in 2018. The program includes biodiversity monitoring, as well as habitat restoration projects. Participants are trained to use scientific protocols, and they provide valuable data to Park managers and biologists. In the first two years of the program, volunteers removed over 50 gardening bags of lesser periwinkle, an invasive plant species, from a forested area near the Gatineau Park Visitor Centre.

The NCC issues over 50 scientific research permits every year for scientists from universities across Canada, federal and provincial ministries, and specialized organizations who undertake research. Research topics related to forests include the effects of climate change and special weather events, Lyme disease, emerald ash borer, forest succession, and wetland dynamics, among others.

A photograph of a man and a young child planting a small, young red pine tree in a grassy field. The man, on the left, is bald and wearing a black jacket, leaning over the tree. The child, on the right, is wearing a blue and white polka-dot jacket with pink roses and a brown and white striped beanie, also looking at the tree. The background is a blurred green field with other people in the distance.

The NCC's Five-Year Action Plan, 2021–2026

Red pine / Pakwanagemag

The Plan for Canada's Capital, 2017–2067, the NCC's core planning framework, commits the NCC to developing a 30-year program to regenerate the forests and tree canopy on federal lands. In support of this commitment, the Forest Strategy includes a vision statement, goals and objectives for the long term (30 years), as well as a short-term (five-year) action plan.

The long-term vision of the Forest Strategy is as follows:

The trees and forests on federal lands in Canada's Capital Region are diverse, connected and resilient. They provide essential ecosystem services, enrich heritage and cultural landscapes, and promote health and well-being equitably for residents and visitors.

The NCC has identified five overarching goals for the Forest Strategy:

- **Understand** our trees and forests
- **Protect** existing canopy cover
- **Plant** the right trees in the right place
- **Manage** for resilience, safety and efficiency
- **Engage** with partners and the community

Under each goal, long-term objectives and short-term actions have been identified. The objectives articulate the tactics that the NCC will pursue to achieve the vision. Actions are the measures that the NCC will undertake in the next five years to meet the objectives, goals and vision, and increase internal capacity to better manage the trees and forests in the short term. Having an action plan that is renewed every five years will allow the NCC to be agile and able to respond to changing pressures and resources.

The actions were developed by a core team composed of staff with forest, conservation, biology and natural resource management experience. The core team identified the challenges facing trees and forests on NCC lands, as well as internal management challenges that this strategy needed to solve. The solutions to these challenges became actions. A prioritization exercise to reduce the list of actions was conducted to reflect the NCC's capacity to successfully implement the five-year action plan.



Vision

Trees and forests on federal lands in Canada's Capital Region are diverse, connected and resilient. They provide essential ecosystem services, enrich heritage and cultural landscapes, and promote health and well-being equitably for residents and visitors.

Understand Our Trees and Forests

OBJECTIVES	ACTIONS
Improve knowledge through data collection and analysis.	<ol style="list-style-type: none">1. Update the 2019 canopy cover study.2. Update the GIS urban forest inventory, including heritage trees.

Protect Existing Canopy Cover

OBJECTIVES	ACTIONS
Protect trees from the adverse effects of development, events and invasive species.	<ol style="list-style-type: none">3. Develop heritage tree protection guidelines, and identify where these guidelines will be applied, through a heritage tree inventory.4. Adopt guidelines for the protection of trees near construction sites and compensation measures for when trees must be cut down.5. Adopt guidelines on invasive species management, and provide invasive species management training to staff, contractors and partners.

Plant the Right Trees in the Right Place

OBJECTIVES	ACTIONS
Plant diverse species and ages of trees strategically to increase resilience.	<ol style="list-style-type: none">6. Plant 100,000 trees strategically, for example, in areas with below-average urban forest cover, where populations are at risk from urban heat islands, and as visual and auditory buffers.7. Identify tree species, varieties, cultivars or seed sources suited to the National Capital Region's future climate for different land types and functions.
Optimize planting sites and tree survival.	<ol style="list-style-type: none">8. Adopt specifications on tree planting operations, establishment, maintenance and monitoring.9. Conduct a feasibility study to explore options related to the establishment of a tree nursery on NCC lands.



Manage for Resilience, Safety and Efficiency

OBJECTIVES	Improve compliance with guidelines and policies.	ACTIONS	10. Explore options for improving compliance with tree and forest management policies and contractual obligations. 11. Better integrate tree protection into project management procedures.
	Manage trees for public safety and to support tree health.		12. Adopt a risk-based approach to better understand forest fire risk. 13. Establish and implement a systematic tree maintenance program in coordination with the urban tree inventory. 14. Complete a literature review to better understand soil contaminant transfer to fruit and nut trees.
	Recognize the value of trees as assets.		15. Identify the financial value of trees for eventual integration into asset accounting processes.

Engage With Partners and the Community

OBJECTIVES	Integrate traditional Algonquin knowledge into forest management. ¹	ACTIONS	16. Support Indigenous forest management capacity building by assisting the Indigenous Guardians program. 17. Use Anishinaabemowin tree names in NCC literature and signage.
	Engage community groups, universities, municipalities and the public in forest stewardship.		18. Explore the possibility of creating an educational demonstration site by converting a managed forest stand in the Greenbelt to a more native structure. 19. Create a corporate/community tree-planting partnership program. 20. Coordinate tree planting on adjoining properties with the City of Ottawa, Ville de Gatineau and adjacent municipalities to maximize resources and benefits.

Priority actions are shown in bold.



Red maple / Misko-ininatig

The NCC's Tree Planting Targets

A GIS-based exercise was completed to identify potential areas for tree planting on NCC lands, as well as the number of trees that can be planted per site. Based on this exercise, the following targets have been identified.

By 2026:

- The NCC will maintain 2017 levels of canopy cover.
- The NCC will plant 100,000 trees.

Additional information about these sites has been analyzed to support their prioritization:

- 1 percent of the tree planting sites are in urban heat islands
- 26 percent of the tree planting sites are on contaminated lands
- 31 percent of the tree planting sites are in riparian zones (i.e. within 30 m of a watercourse)
- 31 percent of the tree planting sites are in socio-economically vulnerable communities
- 49 percent of the tree planting sites are in or adjacent to valued ecosystems and natural habitats
- 72 percent of the tree planting sites are in low canopy areas (i.e. less than 40 percent canopy cover)

This exercise is an evergreen one, and these numbers will evolve as new planting sites are identified.

Planting 100,000 trees on NCC lands by 2026 is an ambitious target. Seventy-four percent of our lands are already forested, leaving fewer spaces available for planting than one might expect. Tree planting must respect the land use designations defined in long-range plans and demonstration plans, which include areas that are not suited for tree plantings, such as recreational fields and view planes, as well as ecosystem types that are not suitable for tree planting, such as meadows and wetlands.

Similarly, a target of maintaining existing canopy cover is ambitious, given the amount of forest the NCC manages, particularly when combined with serious challenges such as climate change, invasive species and urban development.

Next Steps

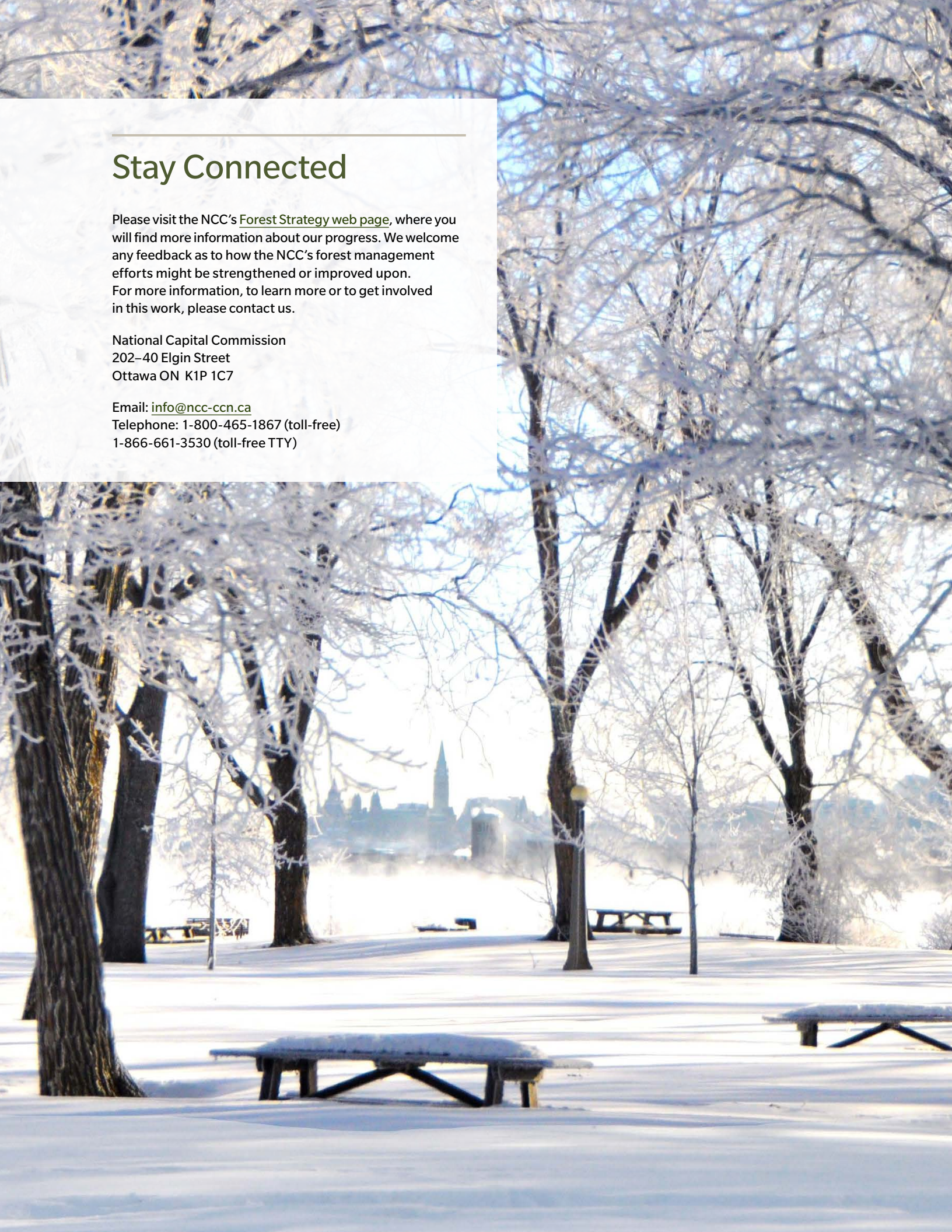
An implementation plan will be developed to guide the roll-out of this strategy. It will establish concrete timelines, internal responsibilities and indicators for measuring success. The implementation plan will focus on the high-priority actions noted in the tables above, followed by the remaining actions. A progress report will be released in 2026. An analysis of the funding required to successfully implement this strategy is under way.

Stay Connected

Please visit the NCC's [Forest Strategy web page](#), where you will find more information about our progress. We welcome any feedback as to how the NCC's forest management efforts might be strengthened or improved upon. For more information, to learn more or to get involved in this work, please contact us.

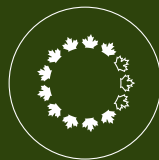
National Capital Commission
202-40 Elgin Street
Ottawa ON K1P 1C7

Email: info@ncc-ccn.ca
Telephone: 1-800-465-1867 (toll-free)
1-866-661-3530 (toll-free TTY)



References

- Nowak, D.J. (2002). The Effects of Urban Trees on Air Quality, USDA Forest Service, Syracuse, NY http://nrs.fs.fed.us/units/urban/local-resources/downloads/Tree_Air_Qual.pdf
- Sander, H., Polansky, S., Haight, R.G. (2010). The value of urban tree cover: a hedonic property price model in Ramsey and Dakota, Minnesota, USA. *Ecological Economics* 69(8), 1646-4656.
- James, P., Banney, R.F., Hart, H.E., Laden, F. (2015). A Review of Health Benefits of Greenness. *Current Epidemiology Reports*, 2:131-142.
- Wolf, K.L. (2005). Business district streetscapes, trees and consumer response. *Journal of Forestry*, 103(8): 396-400.
- City of Montréal. (2017). Climate Change Adaptation Plan for the Montréal Urban Agglomeration 2015-2020.
- Livesley, S.J., McPherson, G., Calfapietra, C. (2016). The Urban Forest and Ecosystem Services: Impacts on Urban Water, Heat, and Pollution Cycles at the Tree, Street, and City Scale. *Journal of Environmental Quality*, 45(1):119-24.
- David Suzuki Foundation. (2015). The impact of green space on heat and air pollution in urban communities: A metanarrative systematic review. pp. 32-36.
- NC State University. (2016). Trees of Strength. Available from: <https://www.ncsu.edu/project/treesofstrength/benefits.htm>
- Coder, K.D. (1996). Identified Benefits of Community Trees and Forests. Athens, GA: University of Georgia Cooperative Extension Service.
- Halifax Regional Municipality. (2013). Urban Forest Master Plan.
- Public Health Agency of Canada. (2015). Climate change, air contaminants, and your health. Available from: <http://www.phac-aspc.gc.ca/hp-ps/eph-esp/fs-fi-b-eng.php>
- Government of Canada. (2016). Health effects indoor air pollution. Available from: <https://www.canada.ca/en/health-canada/services/air-quality/health-effects-indoor-air-pollution.html>
- Nowak, D. J., Hirabayashi, S., Bodine, A., Hoehn, R. (2013). Modeled PM2.5 removal by trees in ten U.S. cities and associated health effects. *Environmental Pollution*, 178: 395.
- Dupras, J., L'Ecuyer-Sauvageau, C., Auclair, J., He, J., Poder, T. (2016). Natural Capital: The Economic Value of The National Capital Commission's Green Network. David Suzuki Foundation.
- Wolf, K. (2008). City Trees, Nature and Physical Activity: A Research Review. *Arborist News*, 17(1):22-24.
- Giles-Corti, B., Broomhall, M.H., Knuijman, M., Collins, C., Douglas, K., Ng, K., Lange, A., Donovan, R. (2005). Increasing Walking: How Important is Distance to, Attractiveness, and Size of Public Open Space? *American Journal of Preventive Medicine*, 28:169-176.
- Louv, R. (2005). Last Child in the Woods: Saving our children from nature-deficit disorder. Algonquin books of Chapel Hill: a division of Workman Publishing, New York.
- Whear, R., Coon, J.T., Bethel, A., Abbott, R., Stein, K., Garside, R. (2014). What is the impact of using outdoor spaces such as gardens on the physical and mental well-being of those with dementia? A systematic review of quantitative and qualitative evidence. *Journal of the American Medical Directors Association*, 15(10):697-705.
- National Ambulatory Care Reporting System. ER Visits 2013-2017, Ontario MOHLTC, IntelliHEALTH ONTARIO, Accessed: November 2, 2018
- The Prairie Climate Centre. Climate Atlas Report, Region: Ottawa. Accessed Sept. 26, 2018. Available from: https://climateatlas.ca/data/grid/299/plus30_2060_85
- McPherson, E.G., Rowntree R. (1993). Energy Conservation Potential of Urban Tree planting. *Journal of Arboriculture*, 19(6), 321-331.
- Ulrich, R.S. (1984). View Through A Window May Influence Recovery from Surgery. *Science*, 224:420- 421.
- Taylor, A.F., Kuo, F.E., Sullivan, W.C. (2001). Coping with ADD: The Surprising Connection to Green Play Settings. *Environment and Behavior*, 33:54-77.
- Whear, R., Coon, J.T., Bethel, A., Abbott, R., Stein, K., Garside, R. (2014), *op. cit.*
- International Film Bureau. (1946). How Indians Build Canoes. Available from: <https://www.youtube.com/watch?v=enMSwz5BWGo>
- Santamour, F. (1990). Trees for Urban Planting: Diversity, Uniformity and Common Sense. *Proceedings of the 7th Conference of the Metropolitan Tree Improvement Alliance*, 7:57-65
- Richards, N.A. (1983). Diversity and stability in street tree populations. *Urban Ecology*, 7:159-171.
- Schwarz, K., et al. (2015). Trees grow on money: Urban tree canopy cover and environmental justice, *PLoS ONE* 10(4): e0122051.
- Harlan, S.L., et al. (2008). In the shade of affluence: The inequitable distribution of the urban heat island. *Research in Social Problems and Public Policy*, 15, 173-202.
- Jenerette, G.D., Harlan, S.L., Stefanov, W.L., Martin, C.A. (2011). Ecosystem services and urban heat riskscape moderation: Water, green spaces, and social inequality in Phoenix, USA. *Ecological Applications*, (7):2637-51.
- City of Montréal. (2017). Climate Change Adaptation Plan for the Montréal Urban Agglomeration 2015-2020.



NATIONAL CAPITAL COMMISSION
COMMISSION DE LA CAPITALE NATIONALE