Clause 11 in Report No. 4 of Committee of the Whole was adopted, without amendment, by the Council of The Regional Municipality of York at its meeting held on March 23, 2017.

11

2017 State of the Forests In York Region

Committee of the Whole recommends:

1. Receipt of the presentation by James Lane, Program Manager, Forestry and Ian Buchanan, Manager, Natural Heritage and Forestry Services.

2. Adoption of the following recommendation contained in the report dated February 15, 2017 from the Commissioner of Environmental Services:

    1. The Regional Clerk circulate this report to the local municipalities.

Report dated February 15, 2017 from the Commissioner of Environmental Services now follows:

1. Recommendation

It is recommended that:

1. The Regional Clerk circulate this report to the local municipalities.

2. Purpose

This report presents Council with the 2017 State of the Forests in York Region report, which provides an update on the status of canopy cover and woodland cover, and summarizes the benefits they provide.

3. Background and Previous Council Direction

Recently approved, York Region Forest Management Plan provides a path forward to achieve canopy cover and woodland cover objectives

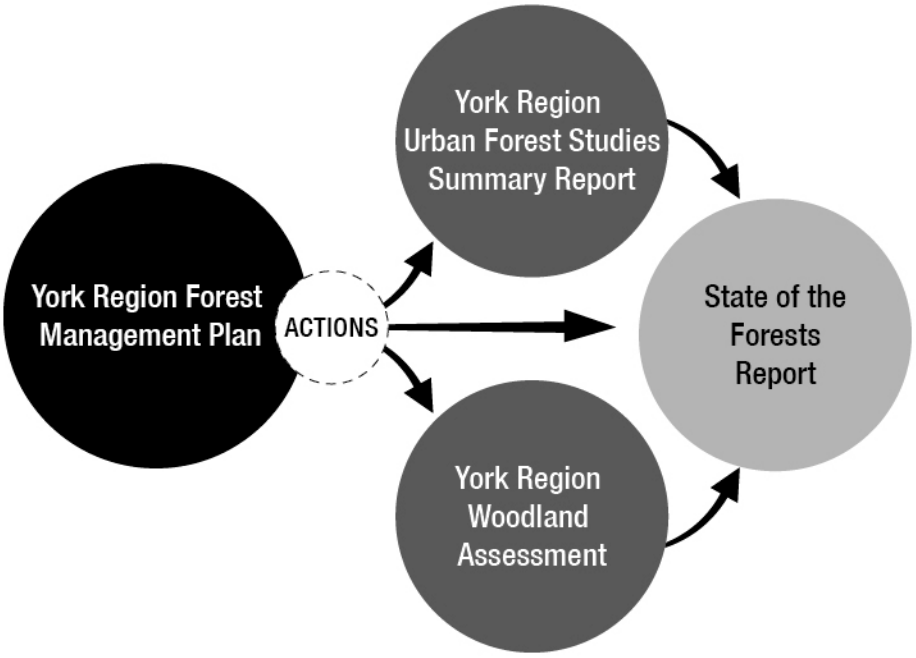
On November 17, 2016 Council approved the York Region Forest Management Plan. The plan sets a path to work towards net gains in canopy cover and woodland cover, and maximizing the benefits provided by all trees. The Plan aims to increase canopy cover from the current 31 per cent to 35 per cent by 2031 and 40 per cent by 2051. This canopy cover objective complements the existing York Region Official Plan 2010 woodland cover objective of 25 per cent by 2031. Woodland cover was last reported to Council on March 27, 2014 as 22.8 per cent (based on 2012 data).

Canopy cover, including all trees, is a good measure to evaluate the contribution of trees to our communities, assess our planting programs, monitor impacts of invasive species and evaluate financial impacts. Figure 1 illustrates the contribution of all trees towards canopy cover.

Figure 1
Canopy cover measures the contribution of all trees

Completion of the Urban Forest Studies, woodland cover re-assessment, and preparation of the 2017 State of the Forests report, are all aligned with goals and key actions identified in the York Region Forest Management Plan (Figure 2).

Figure 2
Advancing York Region Forest Management Plan Actions



This report provides a summary of the existing canopy cover, woodland cover and highlights the specific benefits provided by these green infrastructure assets. The State of the Forests report will be updated in 2021, and then reviewed every five years.

4. Analysis and Implications

Canopy cover was calculated using advanced analysis of high resolution satellite imagery

In partnership with the University of Vermont, high resolution satellite imagery was digitally analysed to calculate canopy cover as part of the local municipal urban forest studies. Computer models assess each pixel in the satellite image and identify the pixel as canopy cover, other natural surface (e.g. grass) or hard surface (e.g. roadway). The analyzed image can be combined with other geographic information, such as land use, to generate detail metrics on existing and potential tree planting opportunities. For rural municipalities, high resolution satellite imagery was not available within the project time frame and manual interpretation of aerial photography was used to estimate canopy cover.

Forest benefits were quantified at the Regional and local levels using field data and the ITREE Eco model

To better understand the structure and composition of forests and the benefits trees and forests provide, urban forest studies included a detailed analysis using United States Department of Agriculture Forest Service ITREE Eco model. Over 100 sample plots were placed in each municipality, where detailed field data on the number, species, size and condition of trees were collected. This scientific, peered review model, uses the field data to generate statistically valid metrics such as leaf area, number of trees, species diversity and tree size distribution for the entire municipality. Using these metrics with local weather and air pollution data, the model calculates quantifiable benefits, such as energy savings, annual carbon sequestration, total carbon storage and annual air pollution removal, provided by the trees and forests in each local municipality. Results of the urban forest studies have been summarized in the 2017 State of the Forests report (Attachment 1).

Forests throughout York Region are comprised of millions of trees of varying size and species

Forests in York Region include over 29 million trees, contributing a total canopy cover of 31 per cent. This forest asset is valued at $12 billion based on an evaluation of replacement cost and consideration of metrics including tree location, size and health. This includes 44,000 Regional street trees and 2,100 hectares of the York Regional Forest.

Our diverse landscapes support many small, young trees and fewer large mature trees. Management must include planting new trees, caring for young growing trees and nurturing our mature trees. Healthy forests include a good mix of different sizes of trees so that as larger trees die, a new generation of young trees takes their place.

Forests in York Region contain approximately 50 different native tree species and are dominated by maple, cedar and ash. Monitoring and increasing diversity will help ensure that a greater number of trees survive emerging threats, including the impact of climate change and invasive species (refer to Attachment 1 for local municipal tree species diversity).

Forests in York Region provide significant economic, social, environmental, and public health benefits

Forests in York Region provide significant social, economic and environmental benefits. Benefits range from those that can be measured with a monetary value (e.g. energy savings), to those that cannot be easily quantified (e.g. aesthetics or public health benefits). Urban forest studies have confirmed many of the benefits including:

- $8 million in annual energy savings from reduced building heating and cooling requirements, reducing costs to our residents and business owners
- Removal of 3,200 tonnes of air pollution, key for public health benefits
- Removal and storage of 77,000 tonnes of carbon annually, valued at $3.8 million, important for climate change mitigation
- Trees provide improvements equivalent to removing 60,000 vehicles off the road annually (10 per cent of vehicles in York Region)
- Shading provided by trees in urban areas can reduced surface temperatures by 10 degrees Celsius

The forests of York Region are relatively young and healthy. As they grow these forests will provide more benefits and further contribute to creating healthy, sustainable and livable communities. However, these forests face many threats, including impacts from climate change and introduction of invasive species such as the Emerald Ash Borer. To protect trees and forests from existing and future threats, ongoing vigilance and investment in management is required.

Woodland cover has increased from 22.8 per cent in 2012 to 23.2 per cent in 2015

On March 27, 2014 staff previously reported to Council that woodland cover was 22.8 per cent based on 2012 data. In 2016 a re-assessment was conducted based on 2015 aerial photography. The results of this re-assessment conclude that woodland cover has increased to 41,244 hectares, representing 23.2 per cent of the Region's land base. Table 1 provides an overview of woodland cover and changes at the local municipal and Regional scales.

Table 1
York Region Woodland Cover

Local Municipality	Woodland Cover 2012		Woodland Cover 2015		Net Gain / Loss (hectares)
	Hectares	Per cent	Hectares	Per cent	
Aurora	880	17.8	918	18.6	38
East Gwillimbury	7,428	30.0	7,436	30.0	8
Georgina	11,586	38.1	10,942	36.0	-644**
King	8,323	24.7	8,825	26.2	502
Markham	1,391	6.6	1,548	7.3	157
Newmarket	333	8.7	376	9.8	43
Richmond Hill	1,339	13.3	1,442	14.2	103
Vaughan	3,132	11.4	3,359	12.2	227
Whitchurch-Stouffville	6,105	28.9	6,396	30.1	291
York Region*	**40,517**	**22.8**	**41,244**	**23.2**	**725**

*Total land base – 177,553.4 hectares
**Reduction is a result of excluding thicket swamps from woodland cover criteria

Tree planting programs and natural expansion of existing woodlands have resulted in a net gain of 725 hectares of woodland cover

Despite site specific gains and losses, an overall net gain of 725 hectares of woodland cover was realized. This was primarily attributed to the natural expansion of existing woodlands, the establishment of new woodlands through tree planting efforts, and some woodland boundary mapping refinements. Examples of new woodlands resulting from tree planting efforts include areas within the Oak Ridges Moraine Corridor Park in Richmond Hill and plantings in Rouge National Urban Park in the City of Markham. Woodland boundary refinements due to natural expansion of woodland edges result in a notable increase in woodland cover particularly in the Township of King. In addition, refinements in woodland criteria and improved interpretation contributed to both addition of new areas and removal of some areas previously identified as woodland cover.

Percentage of woodland cover remains highest in Georgina at 36 per cent despite exclusion of thicket swamps

A significant reduction in woodland cover followed a technical review of a particular vegetation community found primarily in the northern part of the Region

defined as “thicket swamp”. The Region’s consultant recommended excluding thicket swamps as those areas did not contain sufficient tree species or tree cover to be considered woodland. This updated approach is more defensible and consistent with the methodology used by other jurisdictions, and provincial criteria. The exclusion of thicket swamps from the woodland cover criteria contributed to a notable net reduction in woodland cover in the Town of Georgina. Even with this reduction, the percentage of woodland cover in the Town of Georgina remains the highest in the Region at 36 per cent. Some loss of woodland cover due to development and expansion of agricultural operations was documented throughout the Region. However increases in woodland cover offset reductions resulting in an overall net gain. This is recognized as a positive trend and significant achievement in moving towards the 25 per cent woodland cover target.

Integrated monitoring will continue to track progress towards achieving canopy cover and woodland cover objectives

Working with partners to monitor and report back on progress is critical to successful implementation of the York Region Forest Management Plan. Progress towards canopy cover and woodland cover targets will be reassessed in 2021, and then reviewed every five years, and urban forest studies including benefits will be completed in partnership with local municipalities every ten years (2026). A State of the Region’s Forests report will be produced again in 2021 and then every five years to provide an update on plan implementation and progress towards targets.

Study results support the sustainable natural environment goal of Regional Official Plan and multiple Strategic Plan priorities

State of the Forests in York Region demonstrates progress toward achieving the Regional Official Plan 2010 objective to protect and enhance the Greenlands System and work towards the 25 per cent woodland cover target. The studies align with 2015-2019 Strategic Plan strategic priority areas; supporting community health and well-being and managing sustainable growth, including the objective to preserve green spaces.

5. Financial Considerations

Future studies will be funded through existing sources and partnerships with local municipalities

Between 2009 and 2016 the Region contributed $500,000 in funding to undertake Urban Forest Studies and monitor woodland cover across the Region. Urban forest study work was completed in partnership with local municipalities

and conservation authorities. Funding has been identified in the 10 year capital budget to undertake future canopy cover and woodland cover assessments, and implement urban forest studies. The Region will continue to seek partnerships to implement these studies.

6. Local Municipal Impact

Urban Forest Studies support the development of local municipal urban forest management plans and work towards strategic priorities

Strong local municipal support was instrumental in the completion of Urban Forest Studies. The studies provide key information for the sustainable management of forests and support the development of local urban forest management plans as required by the Region's Official Plan. Several local municipalities have already expressed interest in partnering to undertake future canopy cover assessments and urban forest studies. Implementation of priority actions is frequently harmonized with local initiatives to optimize program delivery.

7. Conclusion

Forests provide many benefits to residents and play a significant role in creating healthy, sustainable and livable communities

Woodland cover re-assessment has demonstrated positive gains in working towards our 25 per cent woodland cover objective, while urban forest study results identify the significant potential for canopy cover increases and highlight the broad range of benefits trees provide to our residents. York Region is demonstrating leadership through management of its trees and forests. Initiatives, including the York Region Forest Management Plan, Green Infrastructure Asset Management Plan, Greening Strategy, Urban Forest Studies, and comprehensive monitoring, allow us to optimize our actions to benefit the environment and our residents. The Region's green infrastructure is being managed to proactively contribute to healthy, sustainable and livable communities.

For more information on this report, please contact Laura McDowell, Director Environmental Promotion and Promotion at 1-877-464-9675 ext. 75077 or Ian Buchanan, Manager Natural Heritage and Forestry at ext. 75024.

The Senior Management Group has reviewed this report.

February 15, 2017

Attachment

#7317482

Accessible formats or communication supports are available upon request

ATTACHMENT 1

STATE OF THE FORESTS

MARCH 2017

YORK REGION FORESTRY
Healthy Trees, Healthy Communities

York Region

Forests include woodlands, trees and shrubs in all urban and rural areas

SETTING THE STAGE

Forests play a key role in making our communities healthy, livable and sustainable. They provide significant economic, social, environmental, and public health benefits. Forests include trees and shrubs found in woodlands, urban and rural areas. This includes trees in parks and cemeteries, along streets and on farms, in residents' front and back yards and on other private lands. Whether individual trees and woodlands are owned privately (individuals, businesses) or publicly (municipalities, Conservation Authorities), together they form a forest network providing benefits that are shared by everyone in York Region.

One way to measure the impact of our forest is through the percentage of land area covered by tree and shrub canopies, referred to as canopy cover. York Region has a canopy cover of 31 per cent, which includes 23 per cent woodland cover. York Region's Forest Management Plan identifies the goal of increasing overall canopy cover to 35 per cent by 2031 and 40 per cent by 2051. The Regional Official Plan has established a target of 25 per cent woodland cover by 2031.

Woodlands are heavily treed areas that are at least 0.2 hectares in size. York Region has over 41,000 hectares of woodlands.

Our trees and woodlands are vital assets. They are part of our community's green infrastructure – natural vegetative systems and green technologies that provide services to our communities. Some of these services include removing pollutants from the air and water, reducing stormwater runoff, cooling communities, and public health benefits including improving mental health. Providing the same level of service using traditional built infrastructure instead of green infrastructure can be extremely costly and in some cases impossible.

2031 **35%**
2051 **40%**

York Region canopy cover is 31 per cent with plans to increase it to 35 per cent by 2031 and 40 per cent by 2051.

CANOPY COVER = EVERY TREE

Woodland Cover + **All Urban Trees** + **All Rural Trees**

WHY TREES ARE IMPORTANT

In York Region, there are approximately 29 million trees in woodlands, urban and rural areas with an estimated replacement value of $12 billion.

Trees contribute far more to our communities when you consider all of the direct and indirect benefits they provide. Some of the benefits of trees can be measured with a monetary value, while many of these benefits cannot be easily quantified. One thing is clear, larger trees and healthy woodlands provide exponentially more benefits.

The urban heat island (UHI) effect is where urban areas are much hotter than nearby rural areas because all of the hard surfaces absorb and radiate heat.

In York Region, UHIs exist as pockets, primarily within the urban areas of the southern municipalities, but they are also found in towns and cities.

Hot spots are found where there is a large percentage of hard surfaces that absorb and slowly release heat – in York Region this coincides with industrial areas, employment areas and new residential developments. The effects of UHIs can be reduced by increasing canopy cover in the immediate area. Reducing UHIs is important for the health of individuals in York Region, especially the young, seniors and chronically ill, who are more susceptible to negative health impacts from high temperatures.

BENEFITS OF TREES

IMPROVED HEALTH
Spending time near trees improves physical, emotional and mental health.

CANCER PROTECTION
Trees and woodlands block UV rays and protect us from skin cancer.

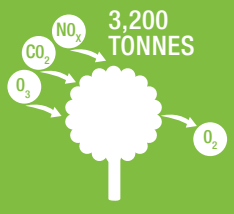
INCREASED PROPERTY VALUE
Properties with trees are valued up to 15% higher.

SAVE ENERGY
Trees properly placed around homes and buidlings can reduce air conditioning needs.

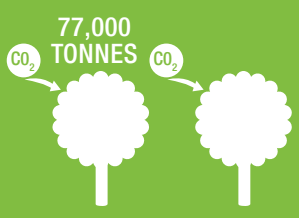
SAVE MONEY
York Region tree cover reduces energy costs by approximately $8 million per year.

REDUCE FLOODING
Trees and woodlands intercept and absorb rainwater which helps reduce flooding.

IMPROVED WATER QUALITY
Trees and forests filter rainwater making it cleaner to drink and swim in.



BREATHE EASY
Trees in York Region remove 3,200 tonnes of air pollutants annually and produce oxygen which improves respiratory health and air quality.

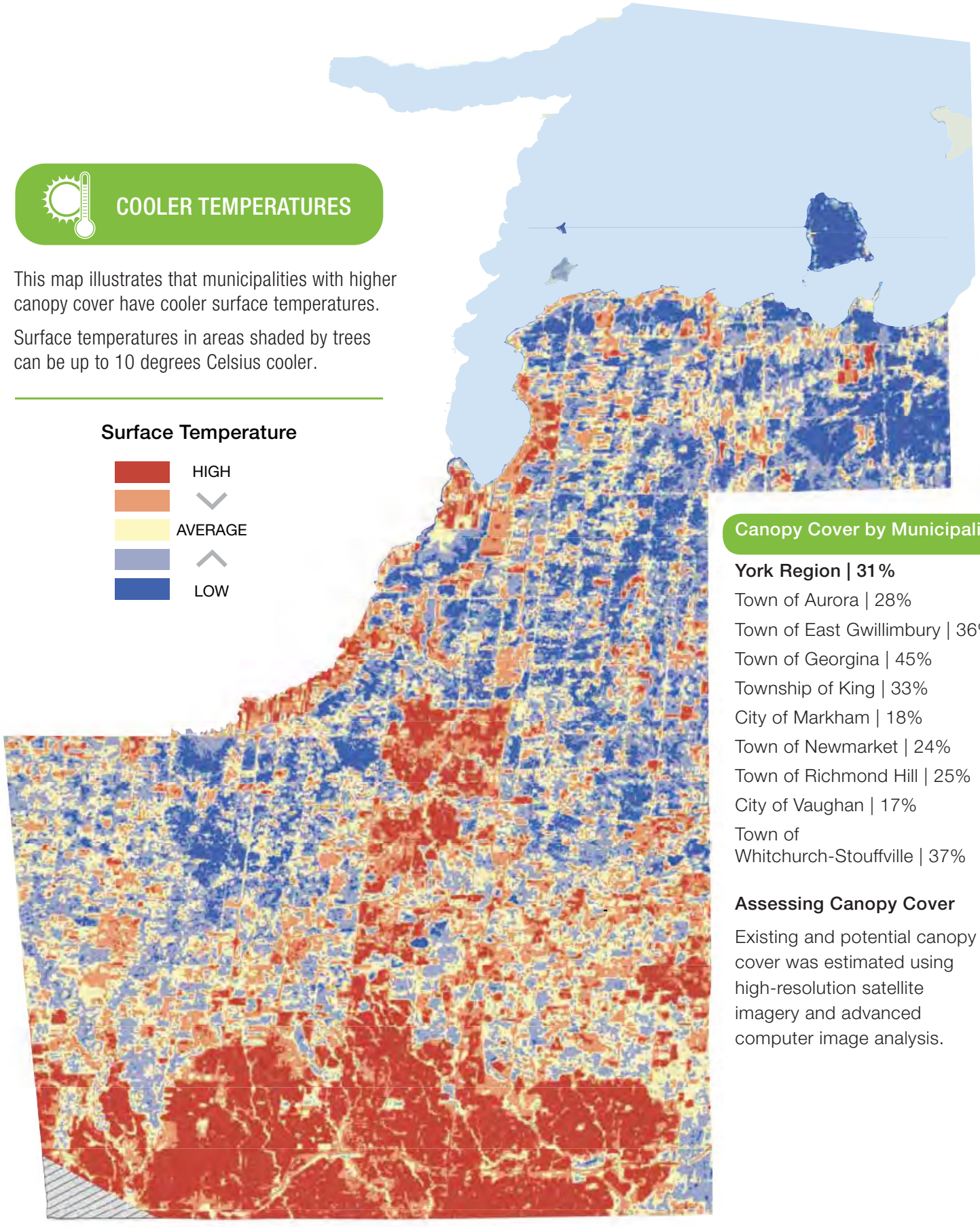


MITIGATE CLIMATE CHANGE
Forests in York Region remove and store 77,000 tonnes of carbon each year - that's equivalent to taking 60,000 cars off the roads annually.

COOLER TEMPERATURES

This map illustrates that municipalities with higher canopy cover have cooler surface temperatures.

Surface temperatures in areas shaded by trees can be up to 10 degrees Celsius cooler.



Canopy Cover by Municipality

York Region | 31%

Town of Aurora | 28%

Town of East Gwillimbury | 36%

Town of Georgina | 45%

Township of King | 33%

City of Markham | 18%

Town of Newmarket | 24%

Town of Richmond Hill | 25%

City of Vaughan | 17%

Town of Whitchurch-Stouffville | 37%

Assessing Canopy Cover

Existing and potential canopy cover was estimated using high-resolution satellite imagery and advanced computer image analysis.

WHAT WE HAVE

WHERE TREES ARE LOCATED

York Region has a canopy cover of 31% (2016) with plans to increase it to 35% by 2031 and 40% by 2051. The rural municipalities tend to have higher canopy cover (as high as 45%) while the urban municipalities have lower cover (as low as 17%). While canopy cover is not expected to be distributed equally across the Region, all towns and cities have the potential to increase their canopy cover.

The distribution of trees and woodlands across each municipality will directly influence the distribution of the benefits provided to communities. Woodlands and neighbourhood parks play an important role in creating habitat and recreation opportunities, and the large number of trees contributes greatly to other ecological services. However, large urban and residential trees (outside of woodlands) can have a significant impact because of their proximity to people, especially for helping to conserve energy, improving mental health, providing UV protection and reducing urban heat islands. It is important to invest in the growth of all trees.

The most significant opportunities for increasing canopy cover are by planting trees on residential, industrial and commercial land, protecting established trees, and caring for the many existing trees across the Region.

Modelling Tree and Forest Benefits

Benefits of trees and forests are calculated using the I Tree Eco model developed by the United States Department of Agriculture Forest Service. The model combines field data collected in each local municipality, local pollution and weather data to estimate forest structure and benefits provided by trees and forests.

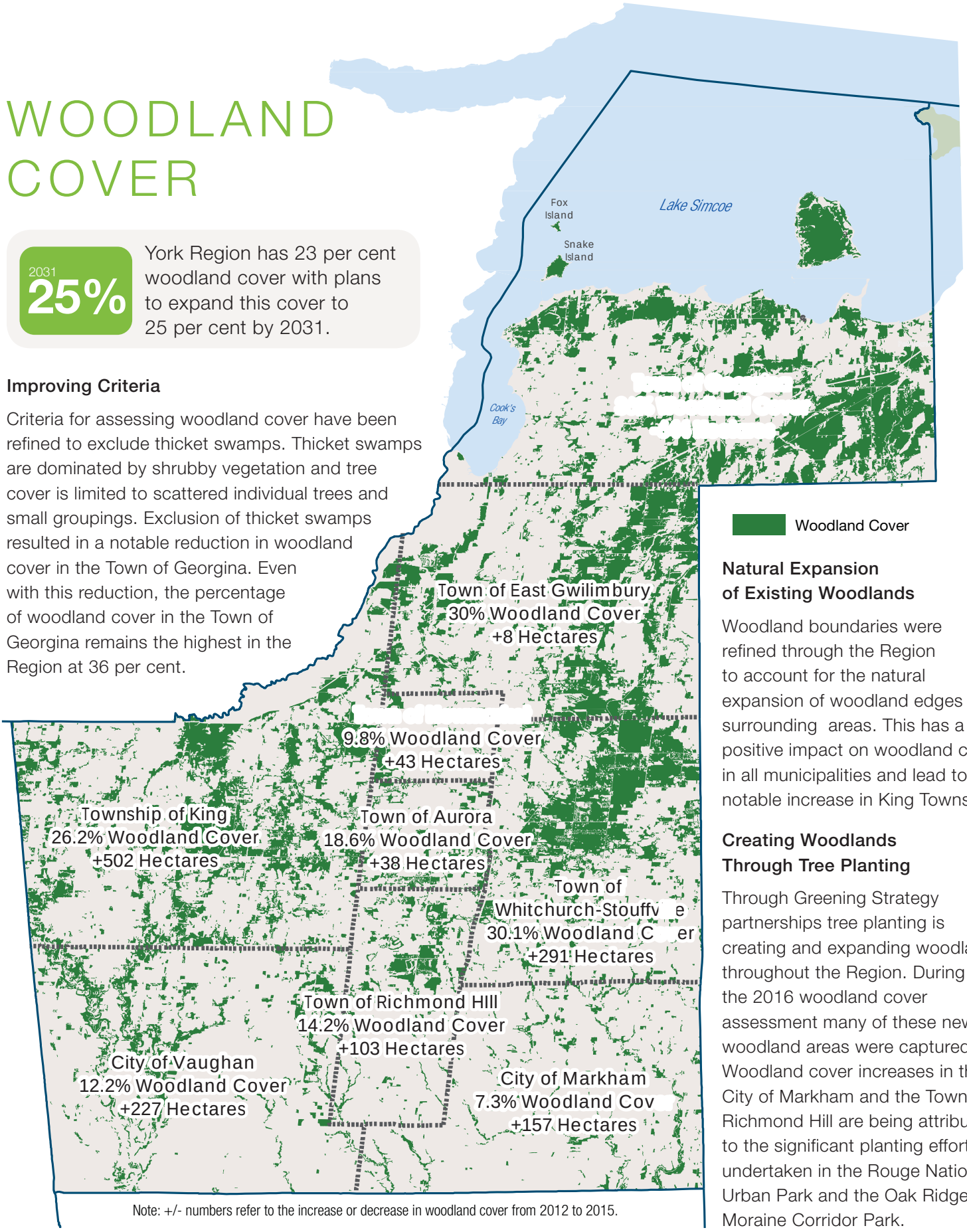
WOODLAND COVER

2031
25%

York Region has 23 per cent woodland cover with plans to expand this cover to 25 per cent by 2031.

Improving Criteria

Criteria for assessing woodland cover have been refined to exclude thicket swamps. Thicket swamps are dominated by shrubby vegetation and tree cover is limited to scattered individual trees and small groupings. Exclusion of thicket swamps resulted in a notable reduction in woodland cover in the Town of Georgina. Even with this reduction, the percentage of woodland cover in the Town of Georgina remains the highest in the Region at 36 per cent.



Note: +/- numbers refer to the increase or decrease in woodland cover from 2012 to 2015.

Natural Expansion of Existing Woodlands

Woodland boundaries were refined through the Region to account for the natural expansion of woodland edges into surrounding areas. This has a positive impact on woodland cover in all municipalities and lead to a notable increase in King Township.

Creating Woodlands Through Tree Planting

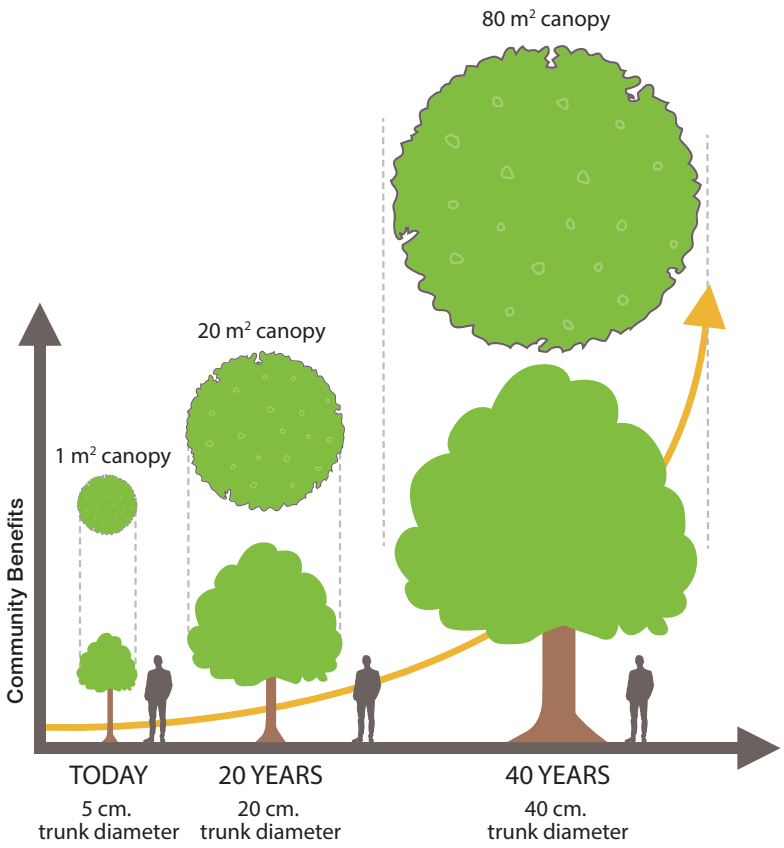
Through Greening Strategy partnerships tree planting is creating and expanding woodlands throughout the Region. During the 2016 woodland cover assessment many of these new woodland areas were captured. Woodland cover increases in the City of Markham and the Town of Richmond Hill are being attributed to the significant planting efforts undertaken in the Rouge National Urban Park and the Oak Ridges Moraine Corridor Park.

TREE SIZE

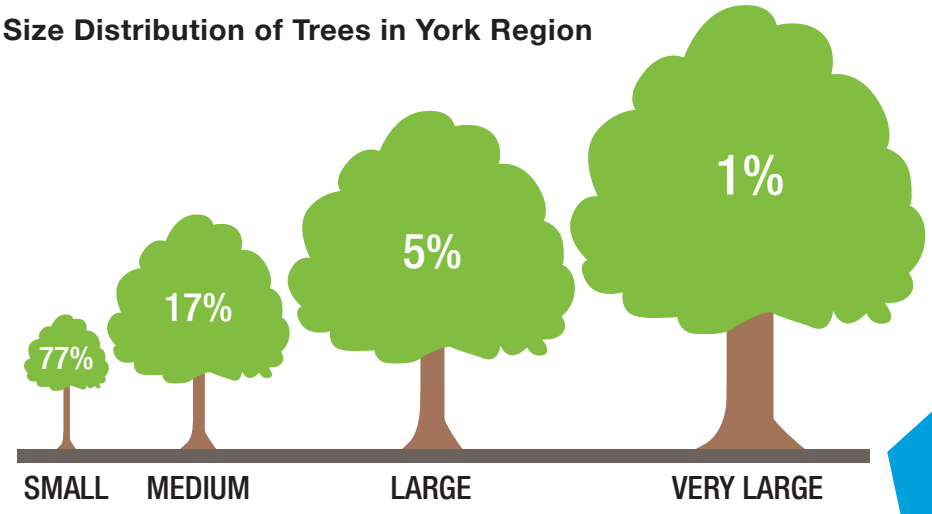
The size and health of a tree greatly affects the benefits it provides. Large trees deliver greater household energy savings, air and water quality improvements, runoff reduction, visual impact, property value enhancements and carbon sequestration capacity. In fact, one large healthy tree can store approximately 65 times more carbon and remove 15 times more air pollution annually than one small tree. Unlike most built infrastructure, trees are a great investment because as they grow their value and benefits increase.

A healthy forest (both individual trees and woodlands), has a good mix of differently sized trees so as large older trees begin to die, there is a next generation of young trees waiting to take their place to continue providing maximum benefits. Small stature trees are also an important feature in a healthy urban forest when planted in spaces too small for large trees.

Forests in York Region have many small, young trees and have few large, mature trees. This means in addition to planting more trees we have to invest in protecting our existing mature trees and caring for our younger trees so they reach their full potential.



Size Distribution of Trees in York Region



DIVERSITY

Forests in York Region contain approximately 50 different native tree species and are dominated by maple, cedar and ash. Increasing diversity can help ensure a greater number of trees will survive a wide range of threats, including the impacts of climate change. It will also help achieve greater overall biodiversity within our urban ecosystems.

Diversity of York Region Trees

Diversity in tree populations is vital to help grow healthy forests more resilient to invasive pests and the impacts of climate change.

	Maple (%)	Cedar (%)	Ash (%)	Pine (%)	Spruce (%)	Poplar (%)	Buckthorn (%)	Birch (%)	Hemlock (%)	Other (%)
York Region	**17**	**17**	**12**	**9**	**7**	**6**	**5**	**4**	**3**	**20**
Aurora	9	23	8	4	3	1	11	—	3	38
East Gwillimbury	1	14	10	6	4	10	—	4	6	45
Georgina	4	23	16	1	2	3	—	6	2	43
King	14	18	11	6	7	4	—	7	1	32
Markham	10	21	8	—	1	—	11	2	5	42
Newmarket	2	10	3	10	4	2	2	3	—	64
Richmond Hill	7	13	13	—	4	5	19	1	1	37
Vaughan	20	10	7	4	3	3	6	1	5	41
Whitchurch-Stouffville	20	11	8	7	5	1	1	2	3	42

One threat that has recently impacted ash trees in York Region is the Emerald Ash Borer, an invasive wood-boring beetle. All untreated ash trees are expected to die as a result of this infestation. Given that 12 per cent of trees in York Region are ash trees, the impact of this pest has been and will be significant.

In The Regional Municipality of York State of Infrastructure Report, regionally owned trees received a rating of “Good” based on the condition, reliability, and capacity of this asset to provide services to residents. The asset value of the approximately 45,000 Regional street trees was estimated to be $30 million.

HOW WE ARE CLOSING THE GAP

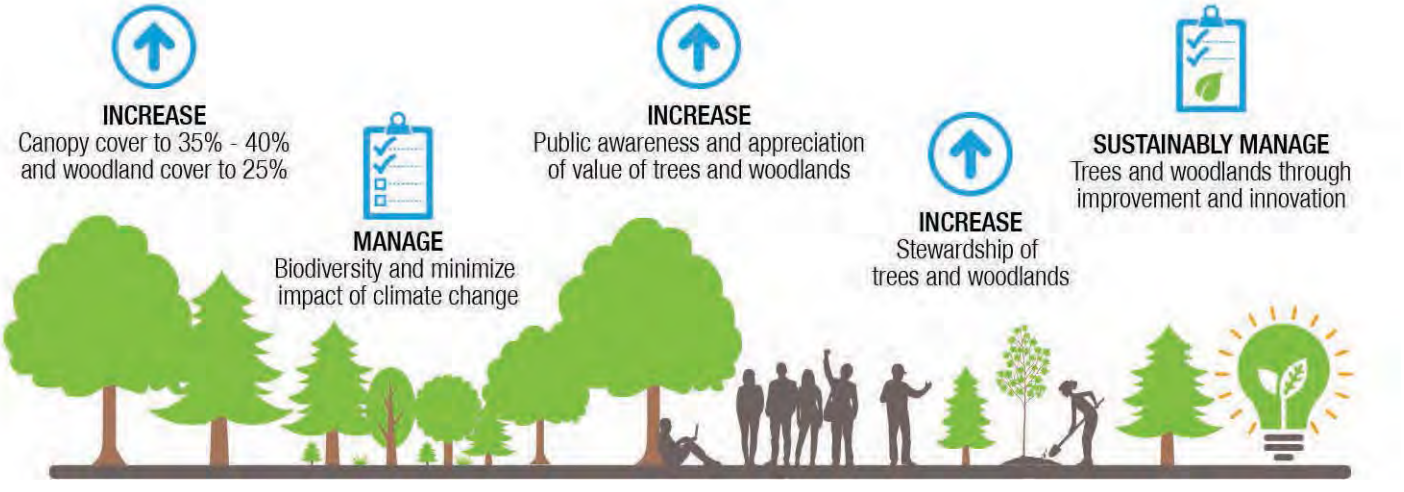
The Region has developed the York Region Forest Management Plan to define targets and maximize the benefits of all trees and to combat threats to them. Through the 79 actions outlined in the Plan, progress will be made toward achieving Regional canopy and woodland cover objectives.

The plan also recognizes the need for partnerships at every level across York Region to improve stewardship of all trees, no matter where they grow. These partnerships could include The Regional Municipality of York, Conservation Authorities, local towns and cities and private landowners (such as homes, businesses and farms).

Planting, protecting and caring for the trees and forests in York Region is a shared responsibility. By working together, we can meet our goals and make sure our trees and forests continue to contribute to healthy, sustainable and livable communities.

A SNAPSHOT OF WHAT WE NEED TO DO

- Look for opportunities to support increasing canopy cover on private and public land, such as tree-planting programs and partnerships
- Support development of local municipal urban forest management plans
- Ensure legislation, policies and bylaws support the protection and enhancement of canopy cover and woodland cover
- Use educational outreach, planting events and marketing initiatives to increase awareness and appreciation of trees and forests
- Increase diversity of species planted
- Expand partnerships, engage community networks and collaborate with the agricultural community to develop more tree-planting opportunities and fight threats to trees
- Develop a framework to manage green infrastructure as a capital asset and better integrating canopy cover and woodland cover initiatives across Regional departments



IN THE GROUND

BEST BETS FOR TREE PLANTING

Focus on a cross section of priority opportunities:

- Residential areas - existing and new
- Conservation Authority properties
- Institutional lands
  e.g. school grounds and parks
- Non-Government Organization
  partnership initiatives
- Government lands
  e.g. Rouge National Urban Park
- Commercial property landscapes
- Natural areas

Partnerships are key to healthy forests

Accessible formats or communication supports are available upon request.

Please contact us by email at accessyork@york.ca or by phone at 1-877-464-9675

york.ca/forestry

York Region

State of the Forests

Presentation to

Committee of the Whole

March 2, 2017

James Lane
Program Manager, Urban Forestry

Ian Buchanan
Manager, Natural Heritage and Forestry
Environmental Services

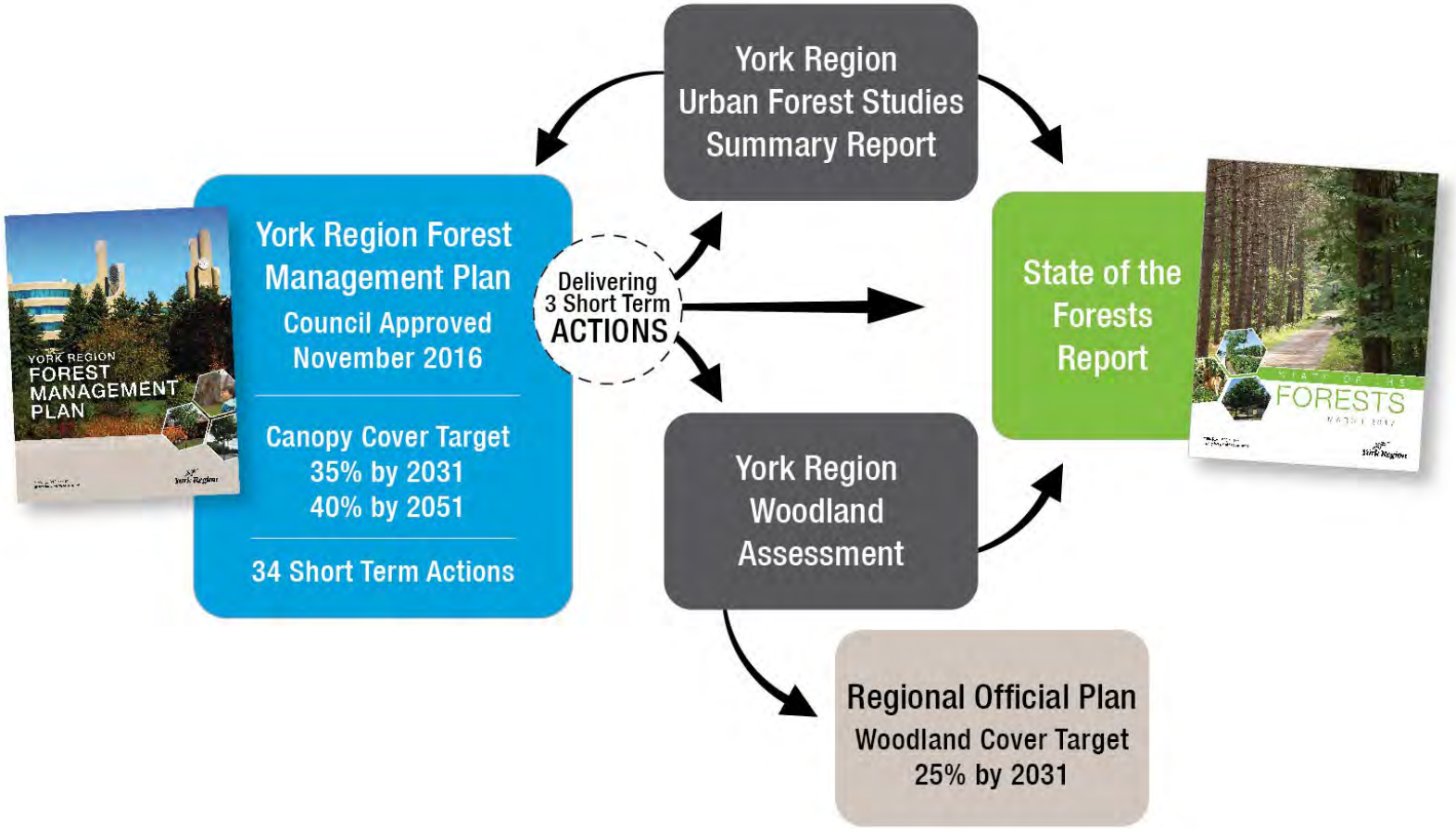
York Region

Outline

- Context
- Achieving canopy and woodland cover targets – alignment
- Urban Forest Studies – benefits
- Progress towards achieving woodland cover target – examples
- Next steps

Studies are quantifying tangible benefits that trees and forests provide to our residents

Linking the Plans and Reports - context



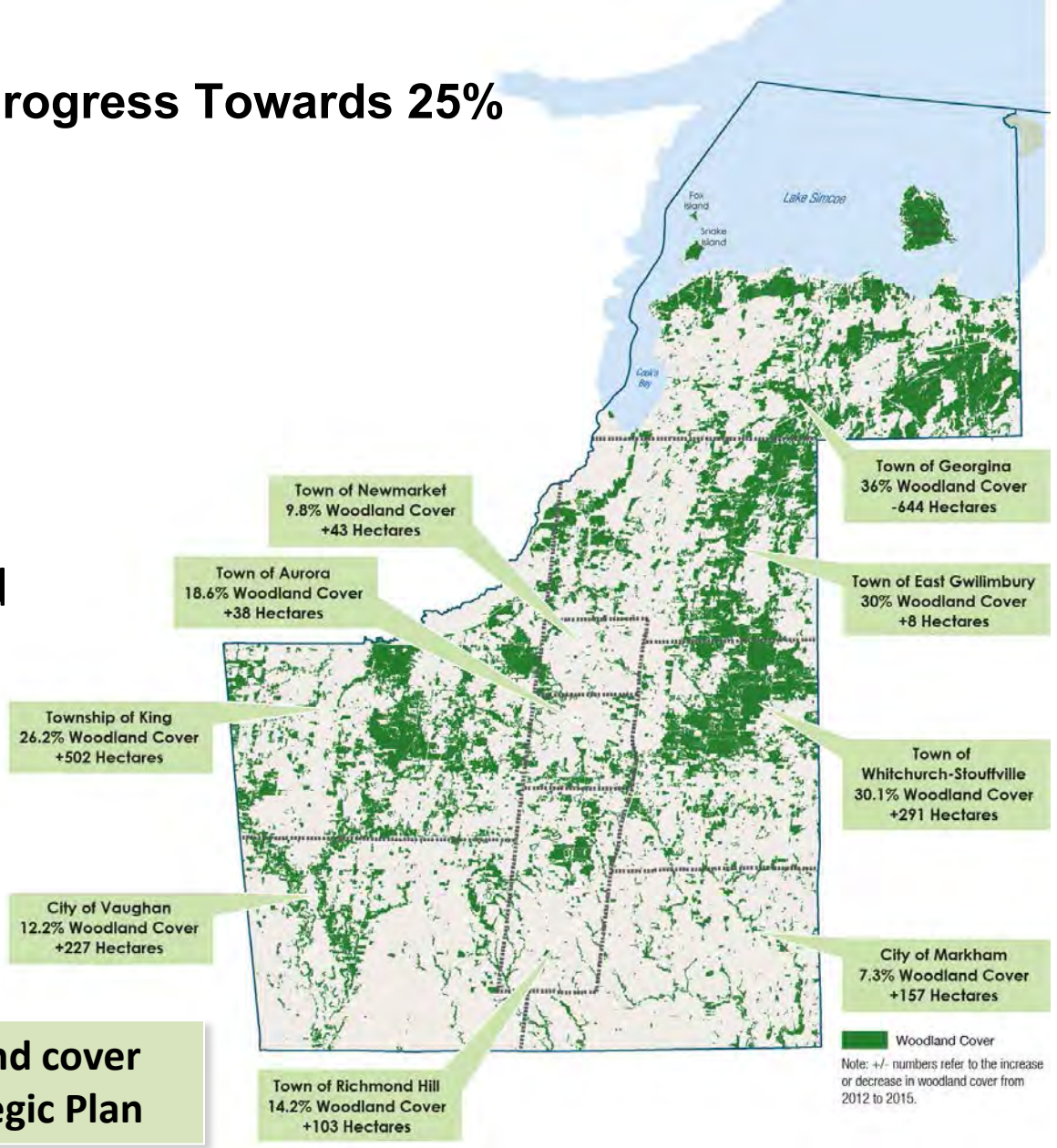
Urban Forest Studies - Results

- Completed in partnership with local municipalities and Conservation Authorities
- Forest structure and benefits estimated using I Tree Eco model
- 29 million trees valued at $12 billion, 50+ native species
- Key benefits provided by trees include:
  - $8 million in energy savings per year
  - Remove 3200 tonnes of air pollution annually
  - Remove 77,000 tonnes of carbon annually, equivalent to taking 60,000 cars off roads

Partnerships are critical to achieving Forest Management Plan objectives

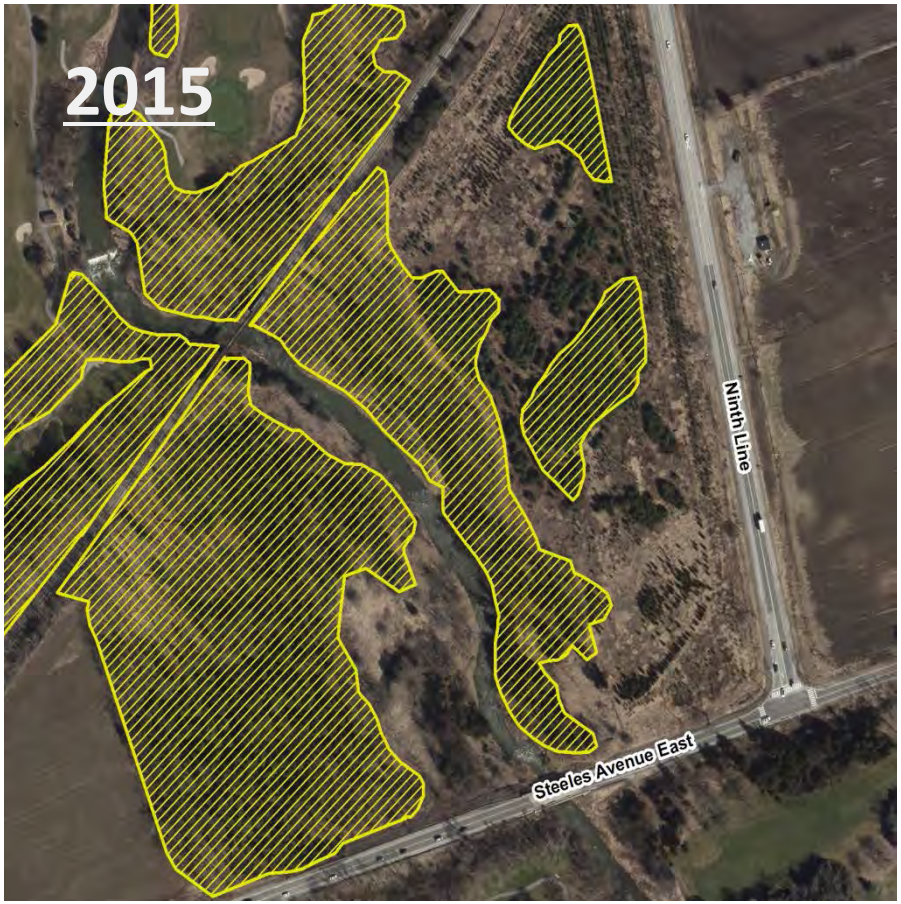
Woodland Cover - Progress Towards 25%

- Woodland cover has increased from 22.8% (2012) to 23.2% (2015)
- Net gains through tree planting, natural regeneration and refined criteria
- Reductions associated with development and exclusion of thicket swamps



On track to achieve 2031 woodland cover target identified in Region's Strategic Plan

Woodland Cover Increases – Tree Planting



Woodland Cover Decreases - Development

Woodland Cover Refinement – Thicket Swamp deletion

Closing the Gap

- Canopy cover and woodland cover are trending positive
- Forest Management Plan sets the path to achieve canopy and woodland cover objectives
- Monitoring and assessment of canopy and woodland cover every five years
- Investments in focused actions optimizes benefits from canopy and woodland cover

Next assessment of progress towards canopy and woodland targets to be included in 2021 State of the Forests