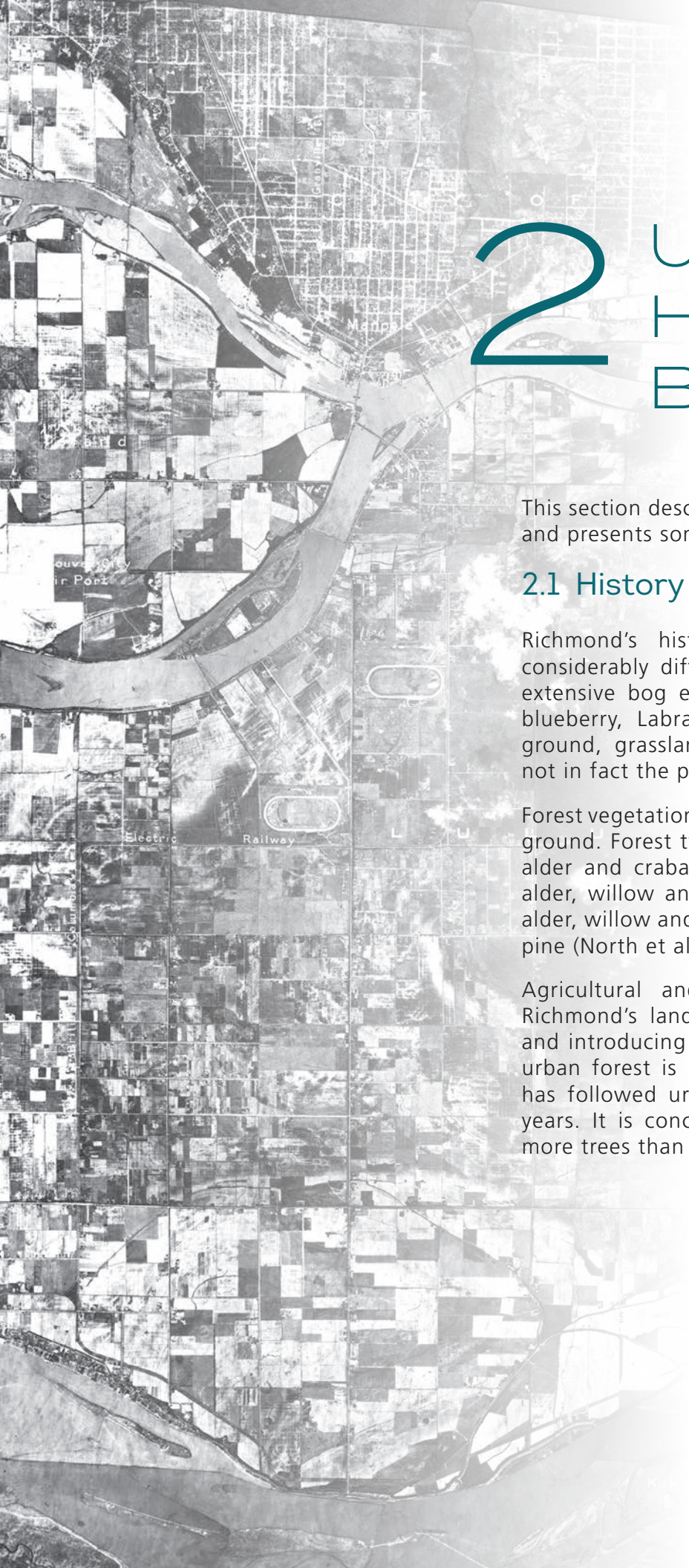


2 Urban Forest History and Benefits

This section describes the history of Richmond's urban forest and presents some of the ways the urban forest is valued.

2.1 History of the Urban Forest

Richmond's historic landscape was quite diverse and considerably different from what exists today. There were extensive bog ecosystems with species such as cranberry, blueberry, Labrador tea and sphagnum moss. On higher ground, grasslands predominated. Trees and forests were not in fact the predominant plant community at the time.

Forest vegetation occurred on the riverbanks and some higher ground. Forest types included spruce forest (spruce, willow, alder and crabapple), mixed wet (cedar, hemlock, spruce, alder, willow and yew) and mixed woodland (cottonwood, alder, willow and crabapple) and bogs often contained shore pine (North et al. 1979).

Agricultural and urban settlement significantly altered Richmond's landscape, changing hydrology, excluding fire and introducing new plant species. Richmond's present day urban forest is largely the result of the tree planting that has followed urban development in the last one hundred years. It is conceivable that the landscape today contains more trees than it did historically.

Richmond was incorporated as a municipality in 1879 and Steveston and London's Landing were the earliest subdivisions. Urban development was fairly slow until the 1950s. Early subdivision design sometimes retained trees on private land but did not typically include planting street trees (Cook, 2002).

In 1958, Desmond Muirhead Associates developed street tree planting plans for subdivisions. Their recommendation was to plant trees in diverse groups rather than linear style to provide variety (Cook, 2002). The plans identified shore pine to be widely planted to distinguish the municipality subregionally (Cook, 2002).

To implement these plans, the City established a Local Area Improvement Plan process that allowed neighbourhood associations to apply for street tree planting. Richmond Park, Gilmore Park and Burkeville subdivisions were planted at that time. The group planting style is evident in those subdivisions today.

From the 1960s, subdivisions typically included more vegetation. Westwind and Montrose developments included linear street tree planting. In the 1990s, there was an extensive City planting and beautification effort culminating in Richmond winning the 1999 Nations in Bloom award.

The City developed its first urban forest strategy in 2001, ahead of many municipalities. Today, Richmond's city-wide canopy cover is 12%. The City is planting hundreds of trees each year and all new developments are required to include street trees and landscapes as part of the approval process. More recently, new planting technologies such as soil cells and structural soil are available to improve tree growing conditions in built up areas of the city. Implementing new technologies and best practices in urban forestry has helped the City to increase the rate of tree planting to its highest level.

City parks were commonly established after the 1940s. Most parks in the

Fashions in tree planting

Common species used in the...

1950s:

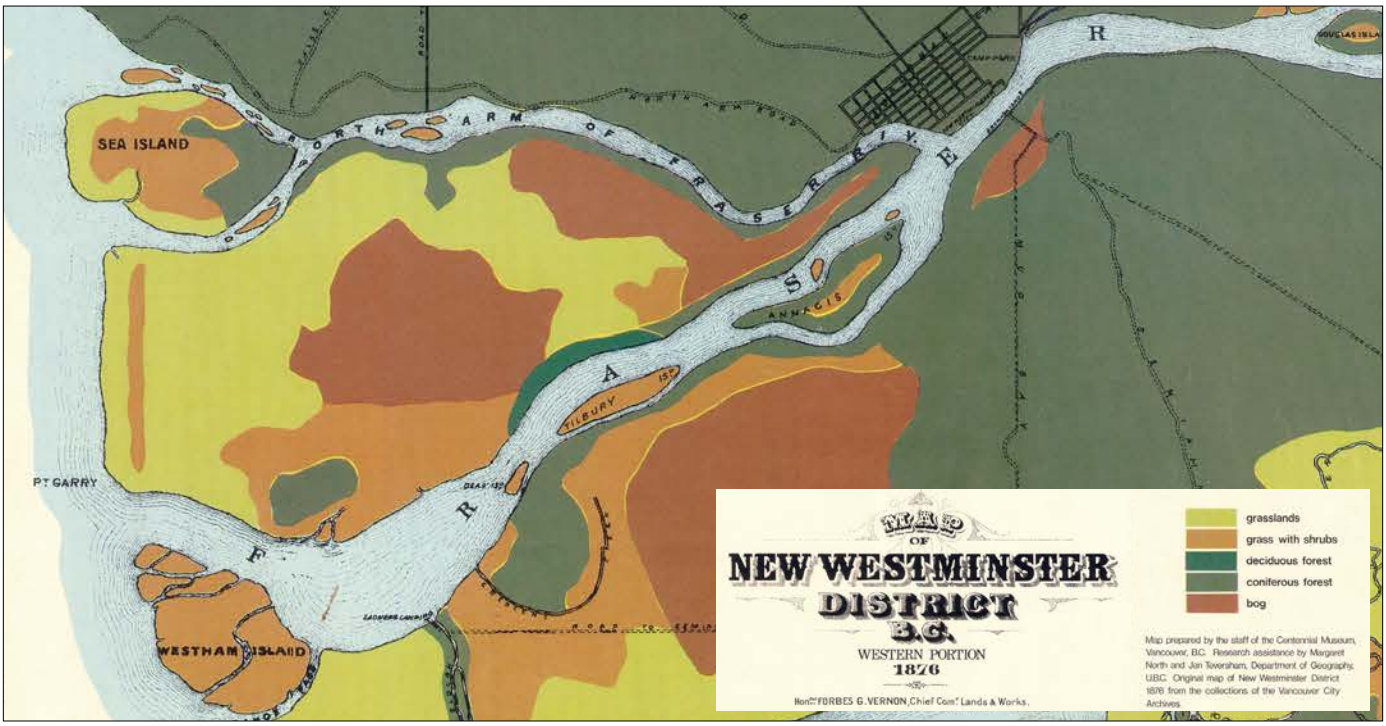
shore pine, Douglas-fir, deodar cedar, paper birch, purple leaf plum, flowering crabapple, flowering cherry, Lombardy poplar, oak, tulip tree, monkey puzzle

***1960s**:*

shore pine, flowering crabapple, tulip tree, purple leaf plum, oak, hawthorn, birch and horsechestnut

Since 2000:

maple, magnolia, cherry plum, oak, apple, dogwood, birch, beech, liquidambar, katsura, western redcedar, pine, spruce and hawthorn

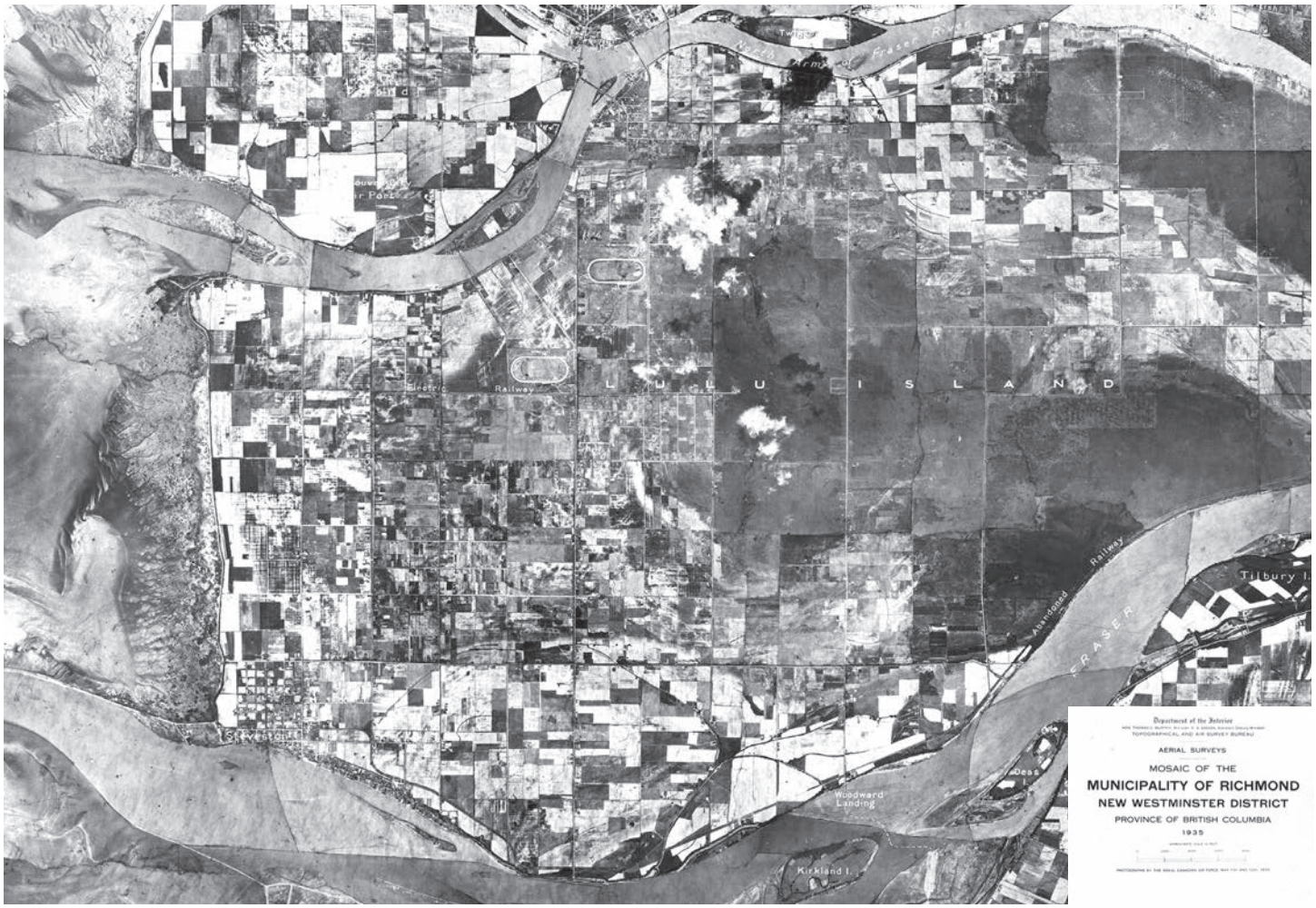


Historically, Richmond was dominated by grassland, shrubland and cranberry bog. Forest ecosystems of western red cedar, hemlock and spruce were limited to isolated patches on Lulu Island and Sea Island.

system are smaller neighbourhood or community parks. Richmond's largest protected natural area is the 80 ha Richmond Nature Park, acquired in the 1970s. Today there are 133 parks that protect 778 ha of open space. Other than the Nature Park, which contains remnant bog ecosystems, most parks contain a mix of native and introduced tree species often in manicured or old farm landscapes.

While most of Richmond's urban forest originates after the 1950s, there are trees that date back to at least the early 1900s (City of Richmond, 2005). One example is highlighted in the photos below – the image on the left shows Minoru Race Track in 1951 and, on the right, the same site with City Hall today. The tree highlighted and possibly others, appear to have been retained when the area was redeveloped for the new City Hall. This tree has the largest canopy spread of any measured in Richmond today.

Aerial image of Minoru Race Track in 1951 (left) and City Hall in 2018 (right) at the same location with arrow pointing to a tree present then and now – this tree has the largest canopy spread of any in Richmond!



The aerial image above shows Richmond in 1935. Most of the landscape is farmland other than large areas of bog.

2.2 The Value of Richmond's Public Urban Forest: the Many Benefits of Trees

Richmond's trees and green infrastructure, just like roads, sewers and dikes, are performing a public utility function. When healthy and well managed, the urban forest produces 'ecosystem services' often defined in four distinct but inter-connected categories:

- **Cultural**: benefits that relate to how people value the urban forest in our way of life such as for beautification, sense of place, spirituality, recreation and tourism.
- **Provisioning**: direct products of trees and forests, such as fruits, nuts, or medicines.
- **Regulating**: benefits from the regulation of ecosystem processes like pollination, air and water quality, storm water flow, shade and cooling. With climate change, the role of trees to mitigate extreme heat and precipitation becomes increasingly important.
- **Supporting**: benefits from supporting habitat, biodiversity and enabling natural processes to occur that maintain the conditions to support life – supporting services are essential to the production of all other ecosystem services.

Some ecosystems services can be assigned a dollar value. In BC, the Municipal Natural Assets Initiative is piloting valuation approaches with several municipalities. The US Department of Agriculture (USDA) provides the i-Tree suite of tools, which enable valuations of some ecosystem services provided by trees. The Council of Tree and Landscape Appraisers provides methods for valuing tree assets. Valuations enable trees and green infrastructure to be accounted for in a city's asset management approach or when calculating compensation. Not all ecosystem services can be measured with the tools referenced above but new methods for valuing natural assets are likely to become available over the term of this Strategy.

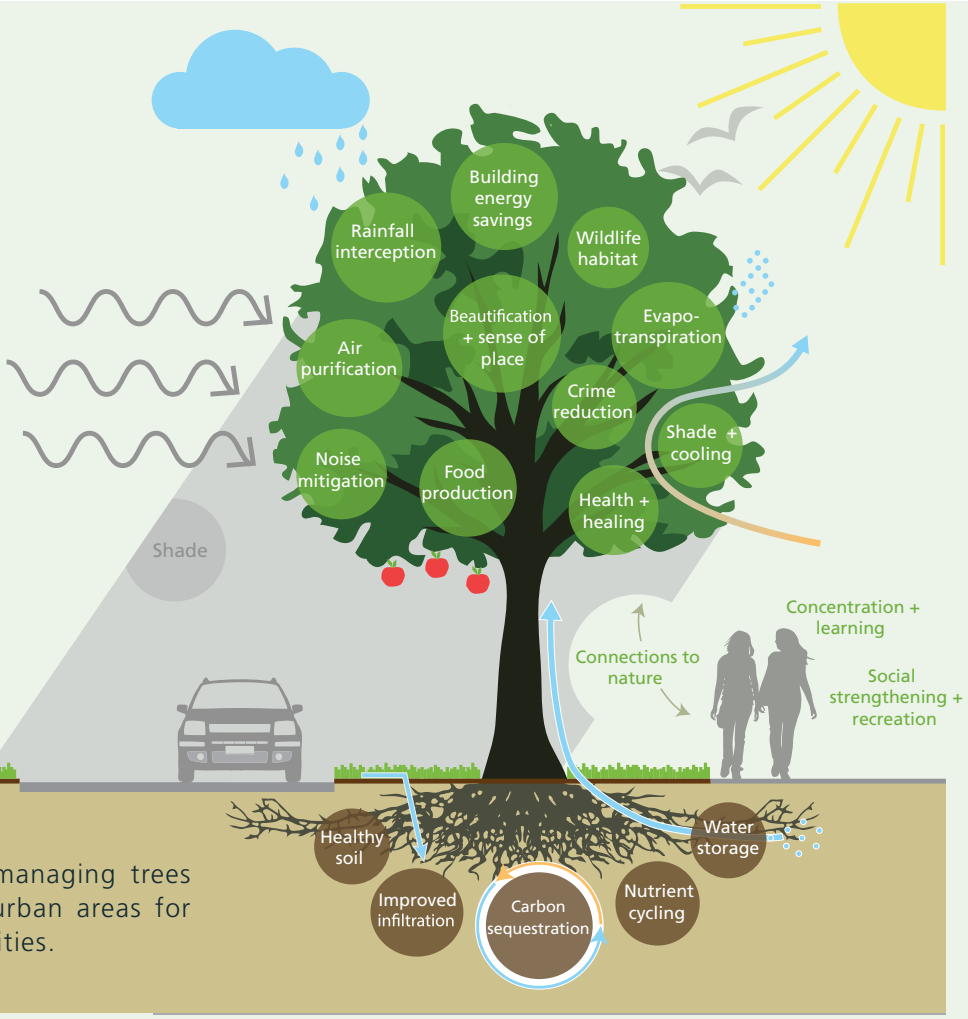
Urban forest benefits

The urban forest is a critical part of Richmond's appeal and livability.

Trees serve to:

- beautify and cool the city
- intercept rainwater
- remove pollutants
- provide habitat for wildlife
- connect people to nature

... among many other benefits.



Urban forestry is...

the art, science and technology of managing trees and natural systems in and around urban areas for the health and well being of communities.

Studies in Japan of *Shinrin-yoku*, or forest-air bathing, have linked the practice to improved immune system response, reduced stress and depression, and lower glucose levels in diabetics (Morita et al. 2007, Ohira et al. 1999)

Street and Park Tree Value

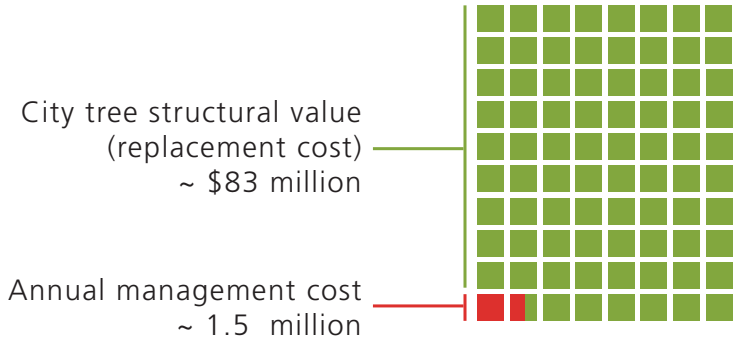
The City has inventoried 56,000 trees and tree groups in streets and parks. However, counts of tree canopies from Light Detection and Ranging (LiDAR) suggest that there are more than 100,000 trees on public land when natural forests are included. The City also manages an estimated 3,000 trees on Richmond School District sites.

Of the City's tree inventory, about 44,000 single trees have been measured for size and species in streets and parks. Consultants used i-Tree Eco to estimate the value of these trees. The i-Tree Eco program estimates structural value, carbon storage and sequestration, air pollution removal and avoided runoff. The structural value is a modified Council of Tree and Landscape Appraisers (CTLA) method for estimating the cost of replacing an existing tree with a similarly sized tree in the same location. The map below shows the location of inventoried trees in Richmond with the highest structural value.

2018 Structural and Functional Value Estimates[1] for Richmond's Inventoried Trees

BENEFIT	AMOUNT	$ VALUE
Structural value	44,057 trees	83,000,000
Total carbon storage	11,710 tons	410,000
Annual Pollution removal	4.9 tons	40,600
Annual Carbon sequestration	276.2 tons	9,670
Annual Runoff Avoided	25,130 m^3	58,400
Annual Oxygen Produced	736.6 tons	Not assessed

1 These values are based on species and dbh in the tree inventory of 44,000 trees. Tonnes are 1,000 kg. Dollar values in i-Tree are carbon @$35/ton, avoided runoff @ $2.34/$m^3$, pollution removal - CO @ $1,486/ton, ozone @ $6,741, NO^2 @ $1,006, SO^2 @ $366/ton and PM2.5@ $234,081/ton based on adverse health effects and US national median externality costs.

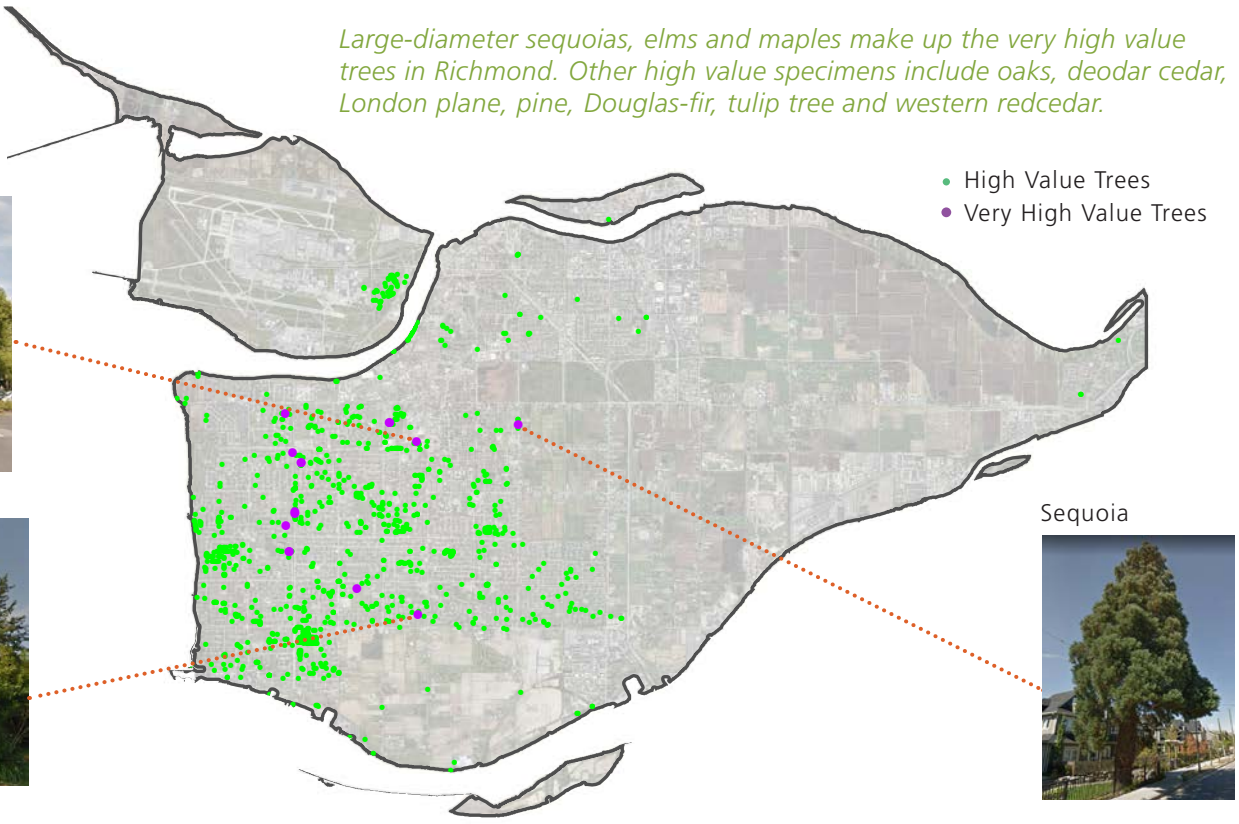


Map of High Value Trees in Richmond

Large-diameter sequoias, elms and maples make up the very high value trees in Richmond. Other high value specimens include oaks, deodar cedar, London plane, pine, Douglas-fir, tulip tree and western redcedar.

Elm at City Hall (see page 7 for more information)

Maple



Sequoia

2.3 What We Heard from the Public

In 2017, the public was asked to share their views on Richmond's urban forest through the City's *Let's Talk Richmond* public consultation portal and at Richmond Harvest Fest, a public event held at the Garden City Lands on September 30th, 2017.

A survey asked people to comment on their satisfaction with trees in their local area. A total of 138 people responded.

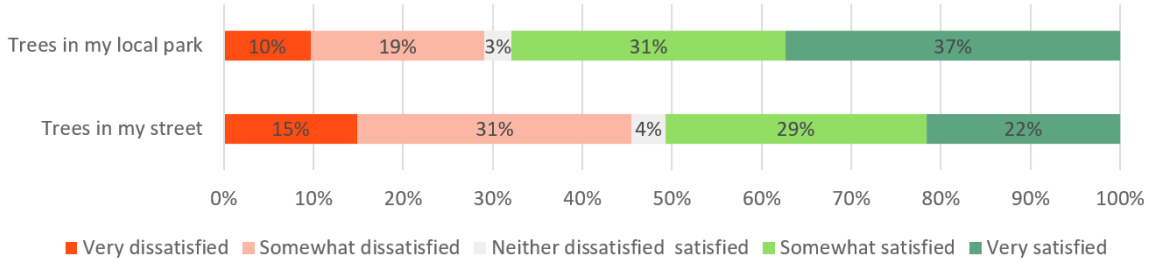
The majority of survey respondents (68%) were satisfied with the trees in their local park. However, respondents were divided on their satisfaction with trees in their street (46% were dissatisfied, and 51% were satisfied; see graph below).

The survey also showed six pictures ranging from low to high canopy cover and with uneven or uniform street tree planting styles. People were asked to indicate which photo was most similar to their street now, and then which photo they would most prefer their street to look like. Some of the survey highlights are listed below.

What respondents streets look like today:

- 45% said uneven street tree planting akin to the diverse group planting style promoted in the 1960s (see page 6).
- 25% said uniform tree planting with small or young trees.
- 20% said they had no trees in their streets.

How satisfied respondents were with the trees in their local area...



What most respondent's streets look like today...

~14% canopy cover (45% of respondents)

~10% canopy cover (25% of respondents)

<2% canopy cover (18% of respondents)

What most respondents would prefer their streets to look like...

>90% canopy cover (43% of respondents)

~14% canopy cover (26% of respondents)

~30% canopy cover (22% of respondents)

What respondents would prefer the trees in their streets to look like:

- 43% said large trees, uniformly planted resulting in very high canopy cover.
- 26% said uneven group tree planting style already common in Richmond.
- 22% said medium trees, uniformly planted.

What respondents most valued about the urban forest:

- Regulating stormwater run-off and mitigating flooding.
- Reducing air pollution.
- Supporting habitat for native plants and animals.
- Heritage and beautification.
- Pleasant places for people to interact and socialize.

Reasons why respondents were dissatisfied with trees in their streets or parks:

- Recent tree removals or damage to trees.
- Lack of tree cover.
- Utilities conflicts, leaves clogging drains and problems caused by tree roots, such as uneven sidewalks.

Opportunities for improvement raised by respondents:

- Increase canopy cover and uniform large or medium tree planting in streets.
- Reduce conflicts with utilities.
- Improve tree protection and maintenance including managing leaf litter in the fall.
- Increase species diversity but plant native tree species whenever possible.

Kids were asked to draw their favourite tree at Richmond Harvest Fest 2017. Visible themes in the drawings included colour, play, food and wildlife habitat.