Humber Youth Stewardship Project: Humber River Valley (Summer 2010)

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CLIMATE'S SAKE

Humber Youth Stewardship Project: Humber River Valley – Summer 2010
ACER 2011©

This publication is part of ACER's Publications, HSY Series.

This manual describes the Humber Youth Stewardship (HYS) project's latest phase of maintaining and enhancing natural areas in the Humber River Valley. In addition to removing invasive species, a new plot was established and measured and the 2008 and 2009 plots were remeasured and coded. Data was analysed and discussed.

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Executive Summary

The Humber Youth Stewardship (HYS) project is a successful organizational partnership initiative, created to maintain and enhance natural areas in the Humber River Valley. Under the direction of the Association for Canadian Educational Resources (ACER), the City of Toronto, and the Humber Arboretum, the 2010 team consisted of two supervisors and ten youth crew members.

The goals for the project were:

- ✓ To remove invasive species and litter in a naturalized area along the slope running next to Highway 27.
- ✓ To monitor plant success.
- ✓ To re-evaluate areas measured from HYS projects in 2008 and 2009.

A total of four plots were measured.

The first phase of the project consisted of removing woody and herbaceous invasive species (IS) along the Highway 27 slope using the City of Toronto protocols. After the invasive herbaceous plants and trees were removed, one new plot was established along Highway 27. It consisted of eight 20mx20m quadrats. The established trees and regeneration (seedlings and saplings) were measured and mapped. IS were removed first so that only native trees and their regeneration were measured and recorded.

After the 2010 plot was completed, the HYS 2008 and 2009 sites were cleared of any new IS growth and mulch was added. The established trees were re-measured and the data analyzed. The crew went back to all 4 plots and attached permanent tags to all trees. Each tree now has a unique tree code for future monitoring.

To complete the restoration part of the HYS program, a Community Tree Planting Day was held on Saturday, October 2nd, 2010, to involve local residents in planting 250 native shrubs and trees. Deloitte employees and local residents each planted half of the cleared site.

Background

The HYS project is a successful organizational partnership initiative created to maintain and enhance natural areas in the Humber River Valley. This is the third year of the project. Ten local high school students and two university graduate students were hired respectively as crew members and supervisors to undertake the project.

The goals for the project were to:

- ✓ Remove IS in a naturalized area on the slopes next to Highway #27.
- ✓ Monitor the remaining native tree success.
- ✓ Restore the area with native species on a fall community planting day.
- ✓ Reevaluate areas measured from HYS projects in 2008 and 2009.
- ✓ Tag all trees measured to facilitate future identification in all plots.

The project was developed to respond to the residents of Ward One who were concerned about the increase in populations of IS and deer. Study sites were chosen by the City of Toronto Forest and Parks Department in conjunction with the Humber Arboretum staff.

Protocols for safety, IS removal, measurement and reporting of the remaining native trees and their regeneration, post removal treatment of stumps, composting of removed herbaceous plants and chipping of the removed woody plants were all developed by the expert parties involved. The community residents and Humber students participated in the site restoration plantings of native trees and shrubs.

The project involved a partnership of the following organizations led by ACER- Association for Canadian Educational Resources:

- ✓ City of Toronto: Councillor Suzan Hall
- ✓ City of Toronto, Natural Environment and Community Programs, Urban Forestry: Cheryl Post
- ✓ Toronto Region Conservation Authority (TRCA): Gary Wilkins
- ✓ Rexdale Youth Resource Centre YMCA: Team Leader, Luca Sirianni
- ✓ Humber Arboretum: Director Melanie Sifton and to the rest of the staff

FUNDING PARTNERS

The project budget included wages and administration costs for the Stewardship Team. Major funding was through Councillor Hall's Clean & Beautiful City Fund, with additional funds from Service Canada and the YMCA.

PARTNER ORGANIZATIONS IN-KIND CONTRIBUTIONS

ACER - administration, monitoring protocol equipment, training and supervision, review of data and report and document distribution.

City of Toronto - expertise in choosing site, identifying IS and removal protocols; post HYS treatment of removed herbaceous and invasive woody; field removal tools/equipment, first aid kit, reference books, storage bags, planting stock and accessories, planting stock and accessories, mulch and field staff, report printing.

Deloitte. – Company's workers volunteered for a community planting-day

Humber Arboretum - safety training for equipment usage, WHMIS certificates, on-site storage and facilities, on-site expertise in identification and site choice.

TRCA - provision of safety boots and T-shirts for crew and supervisors

Ward One Community - 60+ volunteer planters for Saturday morning event

YMCA - advertisement of the positions available locally, short-listing and preparation of local applicants for interviews, provision of room and support for interview day and a site visit made during the project.

ADVISORY TEAM

- ✓ Suzan Hall, City Councillor, Ward One
- ✓ Alice Casselman, President and Carole Berry, Administrator, ACER
- ✓ Cheryl Post, Volunteer Coordinator, City of Toronto Forestry and Parks
- ✓ Sadia Butt, Forest Conservation Specialist, ACER
- ✓ Sid Baller, Superintendent, and Heather Summers, Landscape Technician Co-op Supervisor, Humber Arboretum

PLOT NAMING

All of the plots established with HYS were renamed. The 2009 river site was renamed Plot 1 and the peninsula site was renamed Plot 2. The 2010 site along Highway 27 was named Plot 3, and the 2008 copse site was renamed Plot 4. Naming the new plot "Plot 3" instead of "Plot 4" was made after all the tree tags were created and placed. Thus, the new assigned plot numbers will remain as mentioned above.

Table 1. Plot Naming Clarified

Plot Description	Date Established	Original Plot #	New Plot Number
Riparian (River)	2009	3	1
Peninsula	2009	2	2
Highway #27 Strip	2010	4	3
Copse	2008	1	4

Invasive Species Removal and Plant Maintenance

This year the invasive species removal focused along the slope running beside Highway 27 and the adjacent south-facing slope. The first species to be removed was Canada thistle. Only half of the slope along the highway was cleared of woody invasive species (Figure1). This area was designated by Cheryl Post and team from the City of Toronto. The invasive vegetation removed from the Humber River Valley was growing aggressively and crowding out the native species that are attempting to survive in their natural habitat.

Invasive species will out-compete native ones because they often possess certain traits, such as longer and earlier growing seasons than native plants, prolific reproductive methods, and a lack of natural predators. This often poses a problem for ecosystem diversity, as invasive species begin to out-compete native ones, often resulting in reduced wildlife value and ecosystem function.

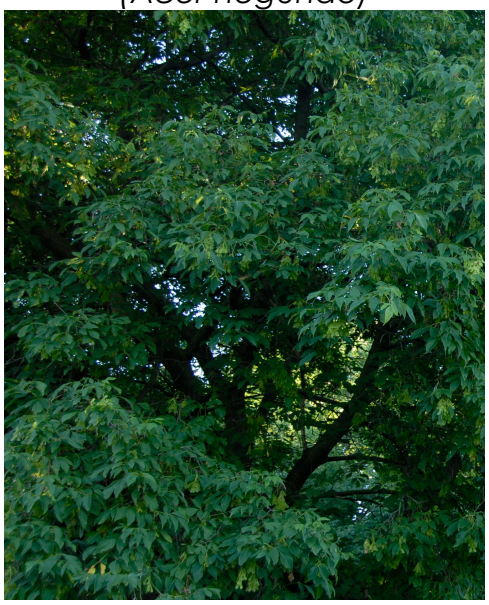
After all the invasives were removed from the slopes, eight 20mx20m quadrats were established (Figure 1).

Figure 1. Clearing of invasive species along Highway 27

INVASIVE SPECIES LIST

Canada Thistle (*Cirsium arvense*)  Photo ACER ©	Canada thistle was the first invasive to be removed. It was already in flower so the priority was to cut it down before it went to seed. It was cut or pulled and placed in piles to dry. Canada thistle was also removed around the 2008 and 2009 sites and some locations along around the pond.
Teasel (*Dipsacus fullonum*)  Photo Jimmy Vincent ©	Teasel was growing in a huge field on the north side slope adjoining the Highway #27 slope. It was cleared later because it flowers later in the summer. If it were cut before flowering, it would most likely re-sprout. The species was very hard to pull so it was cut. In addition, cutting was the preferred option as it lowers the impact on the soil because it decreases the potential for erosion. The teasel was also placed in piles to dry.
Common/Glossy Buckthorn *(Rhamnus cathartica)*  Photo ACER ©	This species was removed with loppers and saws and cut to shin height for later daubing with herbicide. It was well established along the slope and required solid teamwork to remove. Goggles were needed because of the spikes and because the growth was very dense. The cut material was placed beside the trail with the cut ends closest to the trail to allow for easy access for chipping.

Japanese Honeysuckle *(Lonicera sp)*  Photo ACER ©	This species was becoming well established along the slope. It was already bearing fruit and because most of the plants did not have one main stem, it took longer to cut down and pile. The cut material was placed with the buckthorn.
Dog Strangling Vine *(Cynanchum rossicum)*  Photo ACER ©	Dog Strangling Vine (DSV) was not cut unless it was *strangling* a native species. DSV easily re-sprouts so it was best to protect the native species than try and remove the large patches. If it was cut, it was placed in the piles with thistle and teasel.
Grapevine *(Vitex riparia)*  Photo Jimmy Vincent ©	Like DVS, grapevine was not targeted unless it was growing on or around native species. There were several trees along the river, Plot 1, which were dead or dying and covered in grapevine. It was well established along the river.

Crown Vetch *(Coronillia varia)*  Photo ACER ©	Crown vetch was only removed around planted trees or small native trees and shrubs. It was pulled or cut and placed with the other herbaceous plant waste. It was well established along the path beside Plot 4.
Manitoba Maple *(Acer negundo)*  Photo Jimmy Vincent ©	There were very few regenerating Manitoba maples. Some were found well established along Highway #27 but none that could be removed with a chainsaw. If any regenerating trees were found, they were cut or pulled.

Protocol

REMOVAL PROTOCOL

The first priority was the removal of invasive species considered to be seed sources for the pond area. In this regard, the first invasive species to be removed was **Canada Thistle**, which was in flower and would go to seed very quickly. The removal process was performed manually by cutting or pulling, then laying down the removed species in piles to dry. The woody species were the next to be removed. **Buckthorn**, **Russian Olive**, **Japanese Honeysuckle** and **Manitoba Maple** were cut down to shin height so they could be treated to stop re-sprouting.

MEASURING PROTOCOL

The measuring protocols for the 2010 site mimicked those used in 2008 and 2009, which were protocols outlined by ACER and the City of Toronto. The eight quadrats were laid out using measuring tape and compass, marked with T-bars. The bearing of 178° (magnetic) was taken along Highway 27. It was easier to set up the quadrats parallel to the highway to create a well-defined boundary. Starting at the northwest T-bar and proceeding clockwise, trees were tagged and measured in 2 m swaths.

Figure 2. Measuring trees in Plot 4

The 2008 site had tags identifying tree numbers. The crew used tree numbers to re-tag trees and identify the quadrat number (Figure 2). Only the DBH was measured because of the closed canopy.

The 2009 site did not have tags identifying the tree numbers so only the tree species could be identified. The quadrats were re-established using location features from the 2009 data. The height and DBH of the established trees were measured.

Site Description

The main priority for the 2010 Humber Youth Stewardship Project was tree measuring and invasive species removal in Plot 4 (hill slope). Due to exceptional progress the project was expanded to include re-measurement of Plot 4 (copses) from 2008, and Plots 2 (peninsula) and 1 (riparian) from 2009. In addition to re-measuring, herbaceous invasive species removal and re-mulching of former plantings were completed.

COPSES

In the 2008 plot the area selected for the HYS project was located within the riparian zone of the west branch of the Humber River, east of Highway 27. The area consisted of five copses planted 10-15 years ago. Vegetation consisted mostly of native trees and shrubs, which had been overgrown with non-native vegetation. The area chosen was ideal because the extent of the invasions was reversible, and the native inhabitants have a chance of thriving with reduced competition. The plot consists of 8 quadrats (Figure 3).

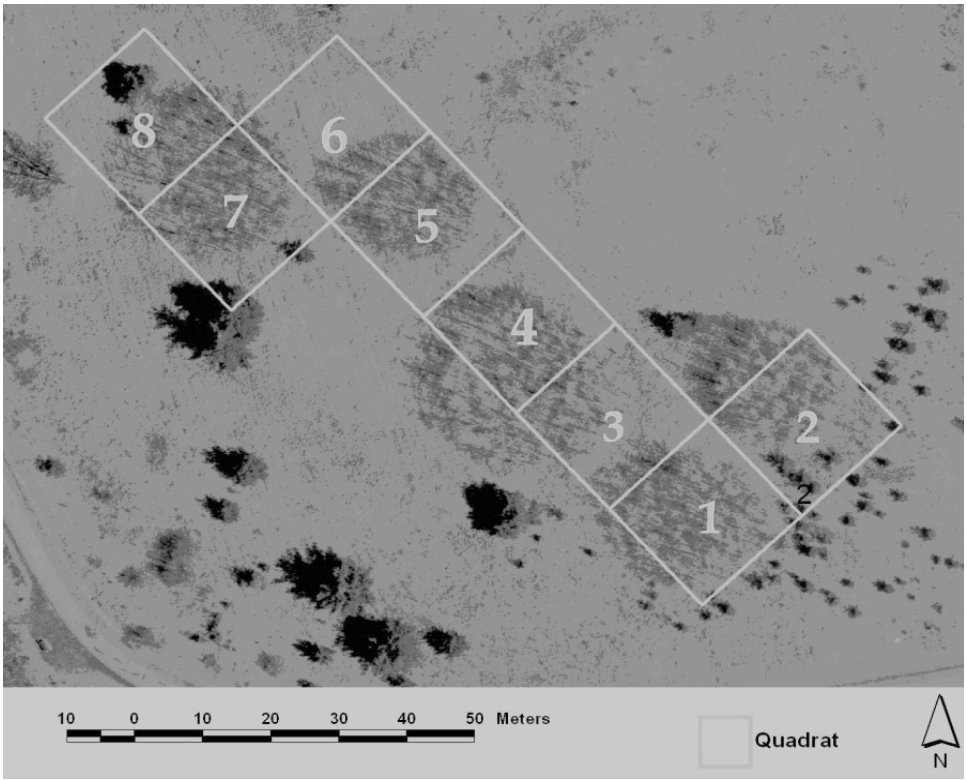


Figure 3. Aerial photo Copses

PENINSULA

The peninsula resides in the middle of the Garfield Weston Pond in the east section of the Humber Arboretum. It was the focus of the 2009 Humber Youth Stewardship Project where trees were measured and invasive species were removed. The peninsula was previously a garden planted in the 1970s. Due to its ornamental origins, the plot contains several non-native, non-invasive species, but it also contains many native trees and shrubs. Of all the former plots the peninsula was found to be in the best shape for low invasive species regeneration, and overall health.

In 2009 the peninsula was divided into five 20mx20m quadrats and seven edge quadrats (Figure 4). See chart of plots.

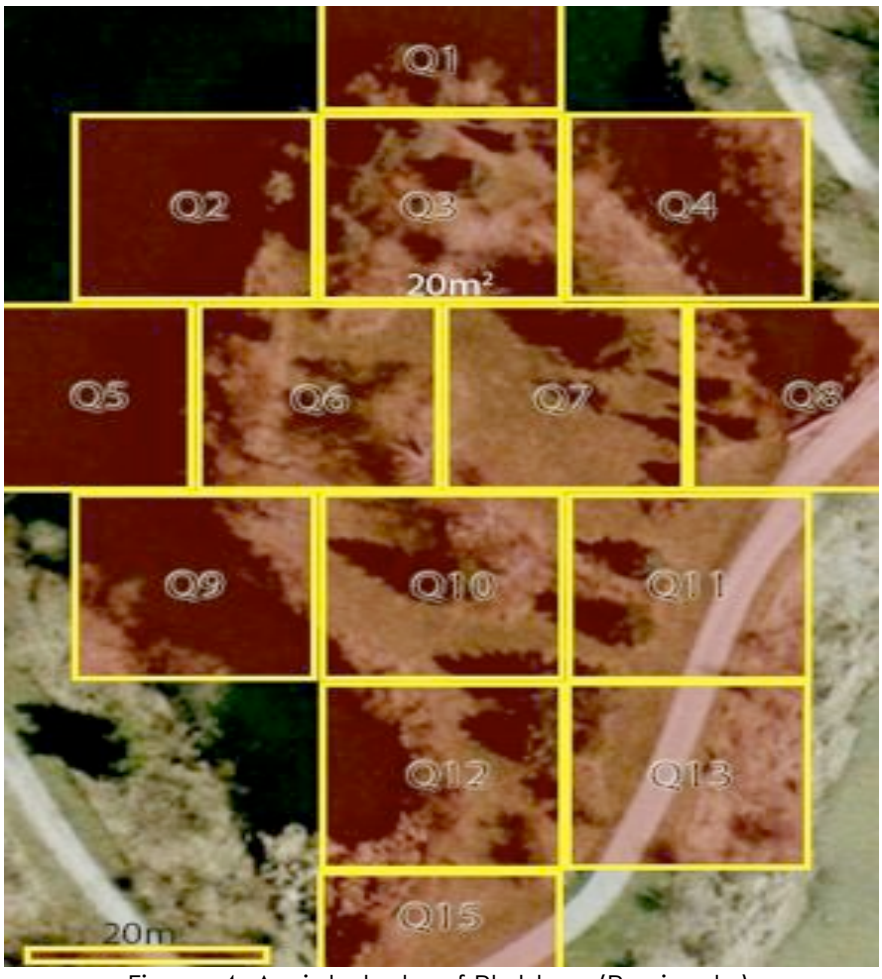


Figure 4. Aerial photo of Plot two (Peninsula).
Map source: Google Earth

RIPARIAN

Plot one is a natural riparian woodlot with several large, old growth trees, estimated to be over 100 years. In addition to the peninsula, this plot was a priority for the 2009 Humber Youth Stewardship Project. However, there has been a resurgence of both DSV (dog strangling vine) and grapevines, which have overtaken many newly planted saplings from 2009 in some quadrats.

In 2009 this plot was divided into four quadrats 20mx20m and one quadrat 15mx15m (Figure 5). Invasive species were found in this area again in 2010.

Figure 5. Aerial photo of Plot one. Google Earth

HIGHWAY #27 HILL SLOPE

The hill slope resides along the Highway #27 corridor on the east side of the Garfield Weston Pond. It was planted in the late 1980s with many native and non-native species. It was started in the hopes that future generations would maintain and upkeep the gardens. Unfortunately, for the last 20 years the plot has been left as a natural regeneration area due to a lack of resources needed to control the spread of invasive plants.

In 2010 the plot was found to be quite overgrown with Buckthorn, Honeysuckle, Russian/Autumn olive, Teasel, and Canada thistle. At the end of the project the site was extensively cleared of herbaceous invasives such as Teasel and Canada thistle along the whole hill slope, while woody invasives such as Buckthorn, Honeysuckle, and Russian/Autumn olive were removed for half of the length of the hill slope.

The area was delineated into 8 quadrats of 20mx20m with the exception of quadrat 8 which was cordoned into a 40mx10m plot. The quadrats were laid out with meter tape and corners were marked with T-bars for future reference.

DATA RESULTS AND ANALYSIS

The first priority for this project was the removal of invasive species and the inventorying of a new plot located on a slope along the Highway #27 corridor, established in the summer of 2010. Tree inventory data was collected in late July after the removal of woody and herbaceous invasive plants. Most of the plants in this plot were fairly healthy with little disease or insect damage. The presence of dead or broken branches was attributed to the competition of Buckthorn or Honeysuckle resulting in tree branch dieback.

Secondly, the three plots established in 2008 and 2009 were revisited for tree and regeneration inventorying and invasive species removal. Finally, in all plots tree tags were put on all trees greater than 4 cm dbh. These plots consisted of the copses, river and peninsula plots. There were several issues in re-establishing the original boundaries for these plots and thus comparative analysis is limited for the river and peninsula plots.

The analysis for all plots[1] includes species distribution charts, diameter class distribution charts and regeneration species charts, for those plots measured in 2010.

[1] NOTE: New names of plots and plot numbers that will be used in the following analysis:
Plot 1: River, established 2009
Plot 2: Peninsula, established 2009
Plot 3: Slope beside Highway #27, established 2010
Plot 4: Copses, established 2008

SLOPED PLOT IN CORRIDOR ALONG HIGHWAY 27 (PLOT 3)

The trees present in this plot were planted and therefore consist of a mix of native and non-native species. From the analysis of the 2010 data on Slope Plot 3 it was found that half of the species consist of Norway maples (25%), spiral cedars (17%) and blue heaven junipers (12%) (Figure 6). It is useful to note that Norway maples are an invasive non-native species and were most likely planted during the 1980s when the garden was started.

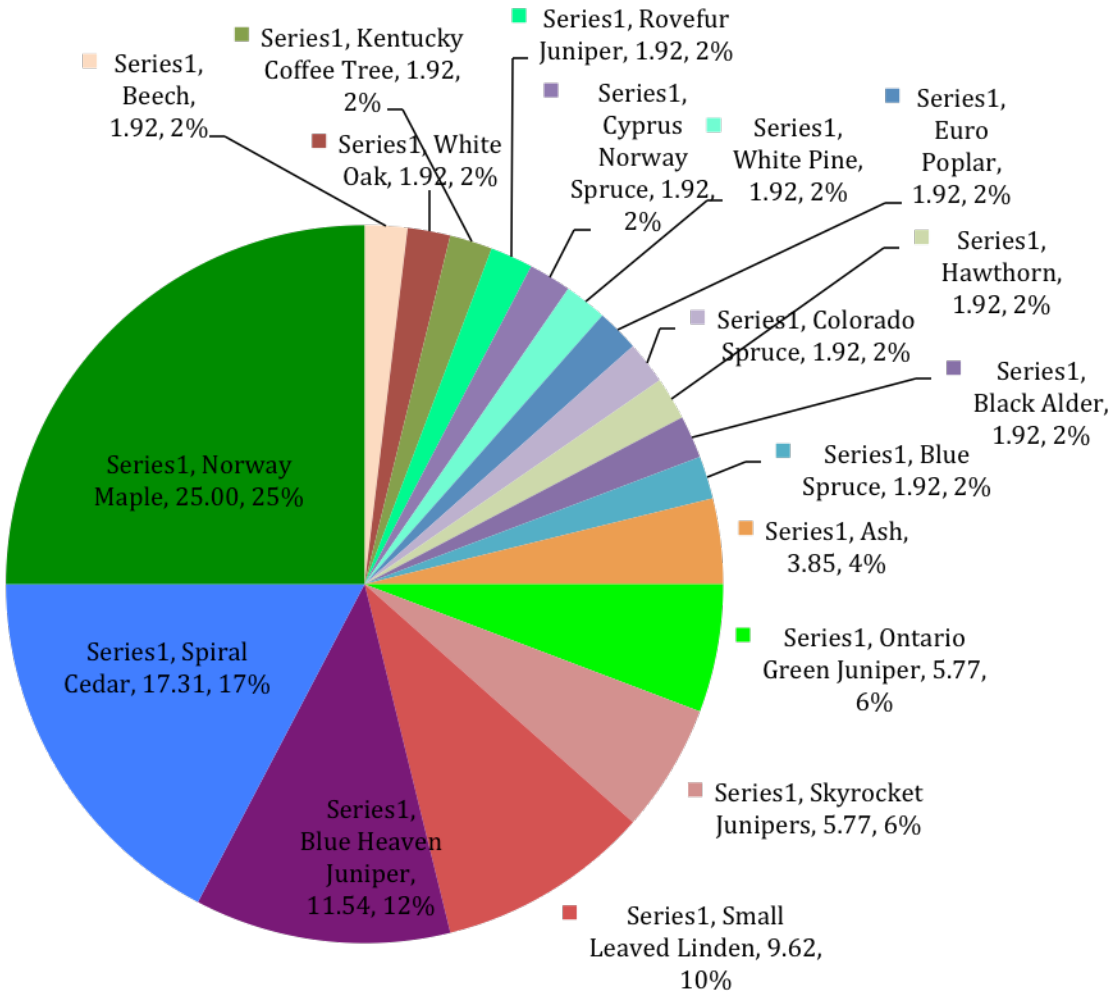


Figure 6. Tree species distribution 2010 for Sloped Plot (Plot 3) at Humber Arboretum

The diameter class chart indicates that the plot consists of small diameter trees and is still a young plantation. Few small trees were found along the hill slope possibly due to competition from many invasive species such as Buckthorn and Honeysuckle. These shrubs compete for light and space pushing out young tree seedlings (Figure 7).

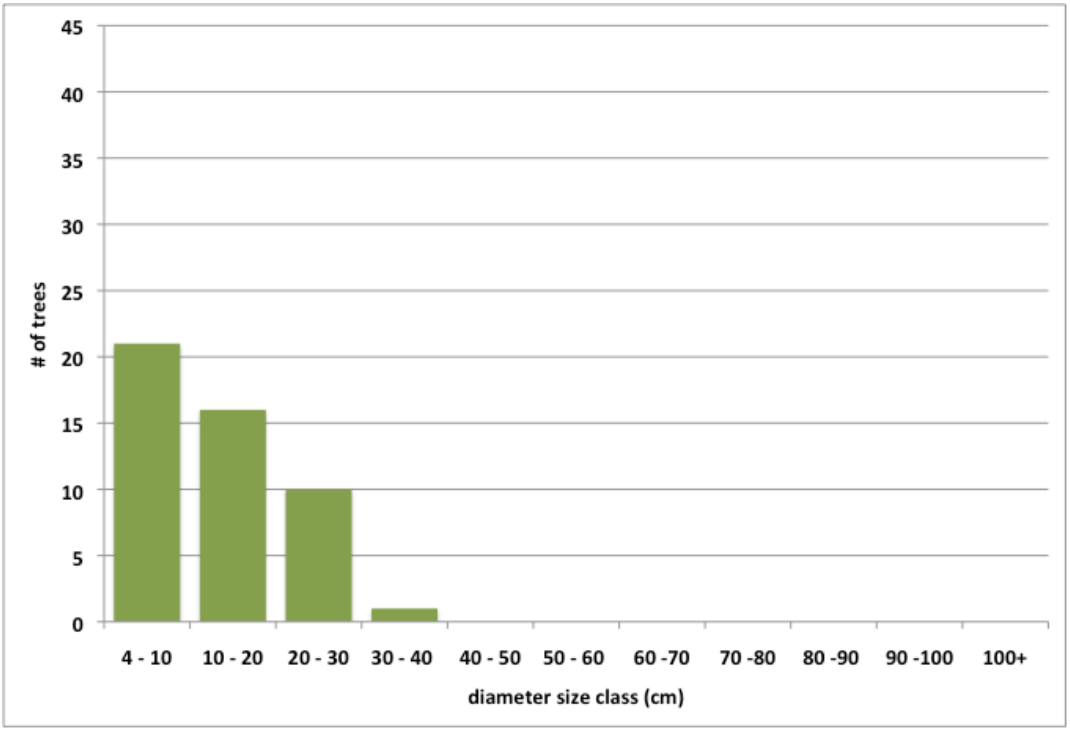


Figure 7. Diameter class distribution for trees on the Sloped Plot (Plot 3) at Humber Arboretum

RIVER PLOT (PLOT 1)

A little over half of the 44 trees in the River plot (Plot 1) in 2009 consisted of Hemlock and Basswood. About one quarter was evenly divided between White oak, Walnut hybrid, Sugar maple and Hawthorn (Figure 8).

Due to the inability to find the original corner points of the original plot in 2010, a new plot location was established that included some of the original trees. The results show that the species composition varies quite significantly. In this plot of 67 trees 50% of the plot still consists of Hemlock (22%) and Basswood (22%). However, the associated species makeup has been changed whereby, Beech make up 19% of the tree species composition and Sugar maple 8% (Figure 9). These make up a quarter of the tree species in this plot. It is interesting to note that Sassafras and Cork tree are now included in this plot.

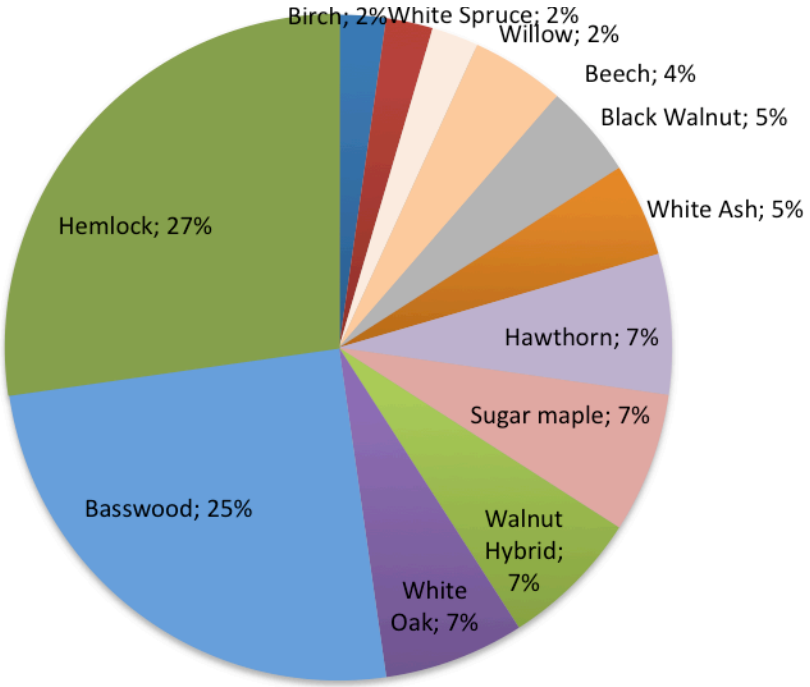


Figure 8. Tree species distribution in 2009 for River Plot 1 at Humber Arboretum

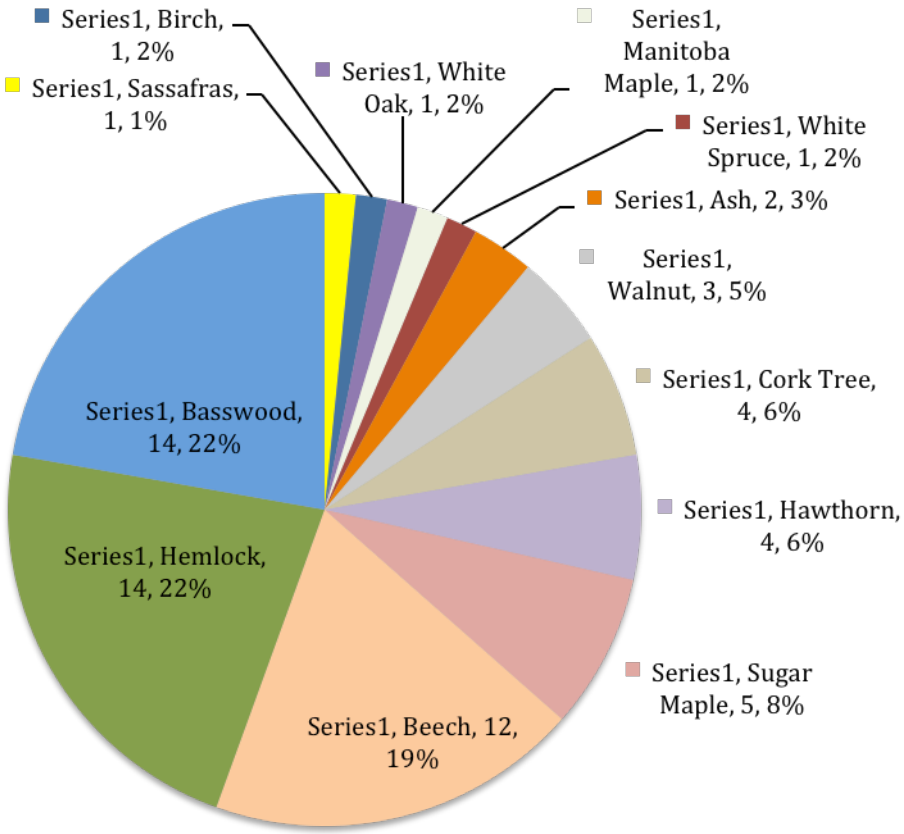


Figure 9. Tree species distribution in 2010 for an adjusted river plot (Plot 1) at Humber Arboretum

The dbh size class for the adjusted plot generally follows a reverse j-curve. It is assumed that the trees in this plot were not planted due to the species composition and that the plot has characteristics of an unevenly aged mixed forest. The plot contains 2 significantly large American beech trees that are 107.1 and 97 cm in dbh, as well as two large Sugar maple trees that are 79.4 and 96.7 cm in dbh (Figure 10).

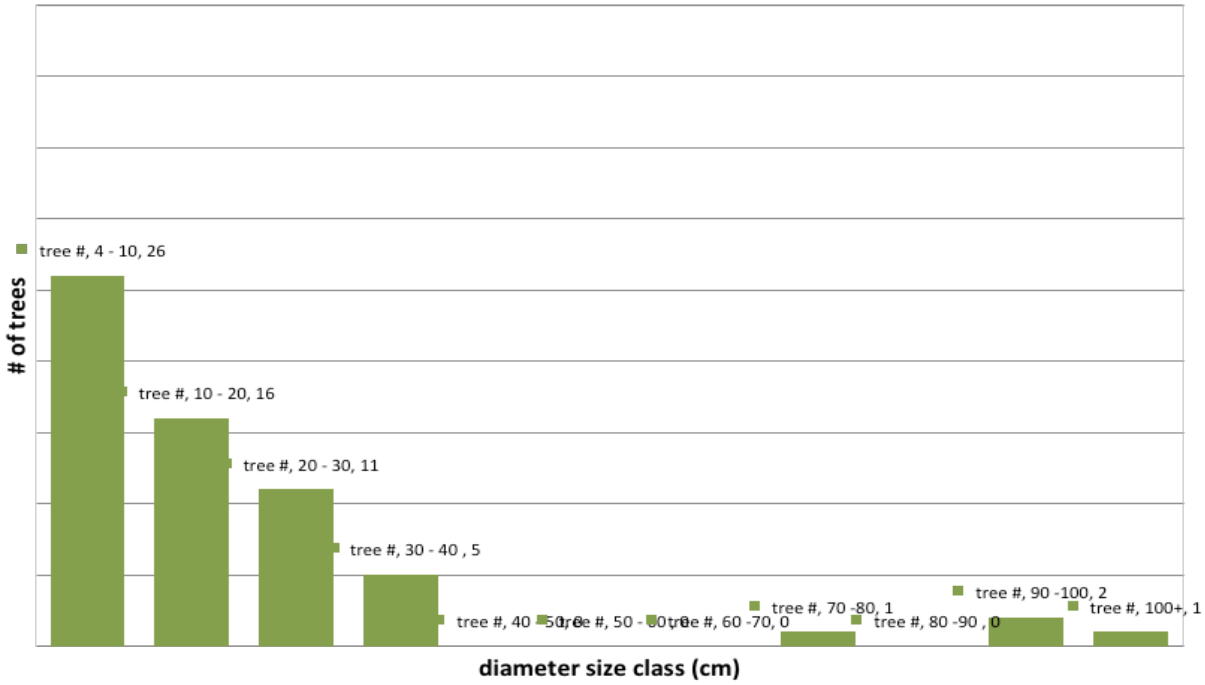


Figure 10: Diameter size class distribution in 2010 of the adjusted River Plot 1 trees at Humber Arboretum

Regeneration species were also inventoried and the composition varies considerably from the established trees. Only 5 species are found regenerating in this area. These are mainly those species that are highly adaptable and are able to grow in more restrictive soil conditions. The majority of regeneration stems were found to be Tree of heaven (34%) and Sugar maple (33%) (Figure 11).

Tree of Heaven is also highly invasive as it has a high seed dispersal rate and is an opportunistic tree that can establish itself in a wide range of conditions. Both Sugar maple and Tree of heaven are able to grow under dense canopies and also in gaps. Choke cherry, White ash and Speckled alder make up the rest of the regeneration species in the area.

It is interesting to note that in the plot there are no Speckled alder or Tree of heaven in the overstorey but these trees do exist in the area and in neighbouring plots, attesting to their successful dispersal mechanisms.

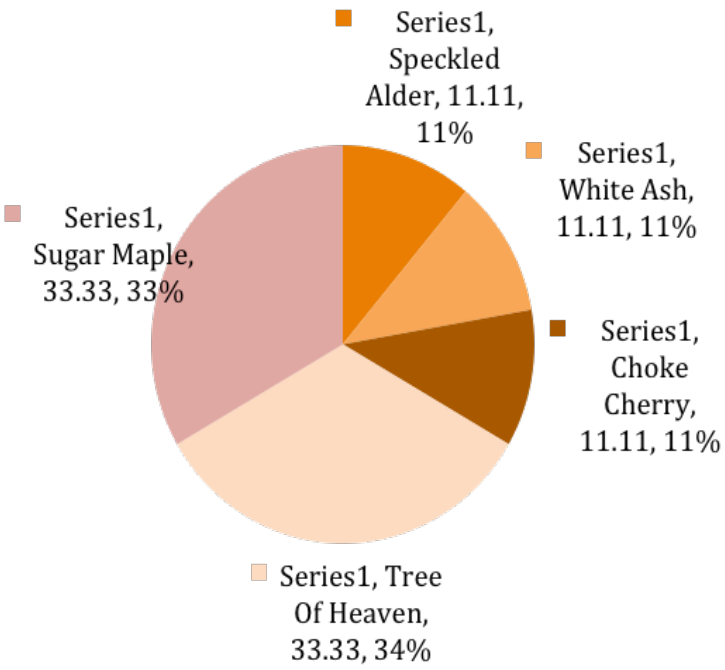


Figure 11. Regeneration species distribution in River Plot 1 at Humber Arboretum

PENINSULA PLOT (PLOT 2)

In the Peninsula plot (Plot 2) it was found that much like in River Plot 1 the number of established trees increased from 75 in 2009 to 92 in 2010. Much of the observed difference was due to minor differences in re-establishing the original quadrat lines since all pre-existing plot markers were not found.

For species distribution it is thought that the large spike in Kentucky coffee trees (KCT) in 2009 and the subsequent drop in numbers in 2010 was due to differences in identification skills hence many Tree of heaven species were incorrectly identified as KCT.

It is suspected that the White spruce decrease and the subsequent increase in observations of both Colorado spruce and Compact oriental spruces may also be due to the same issue (Figures 12 and 13). To verify tree identities an independent audit by an expert will be needed.

This plot has considerably more species and consists of many non-native species. These may have been planted or may have been established as seedlings in the planted sections of the Humber Arboretum.

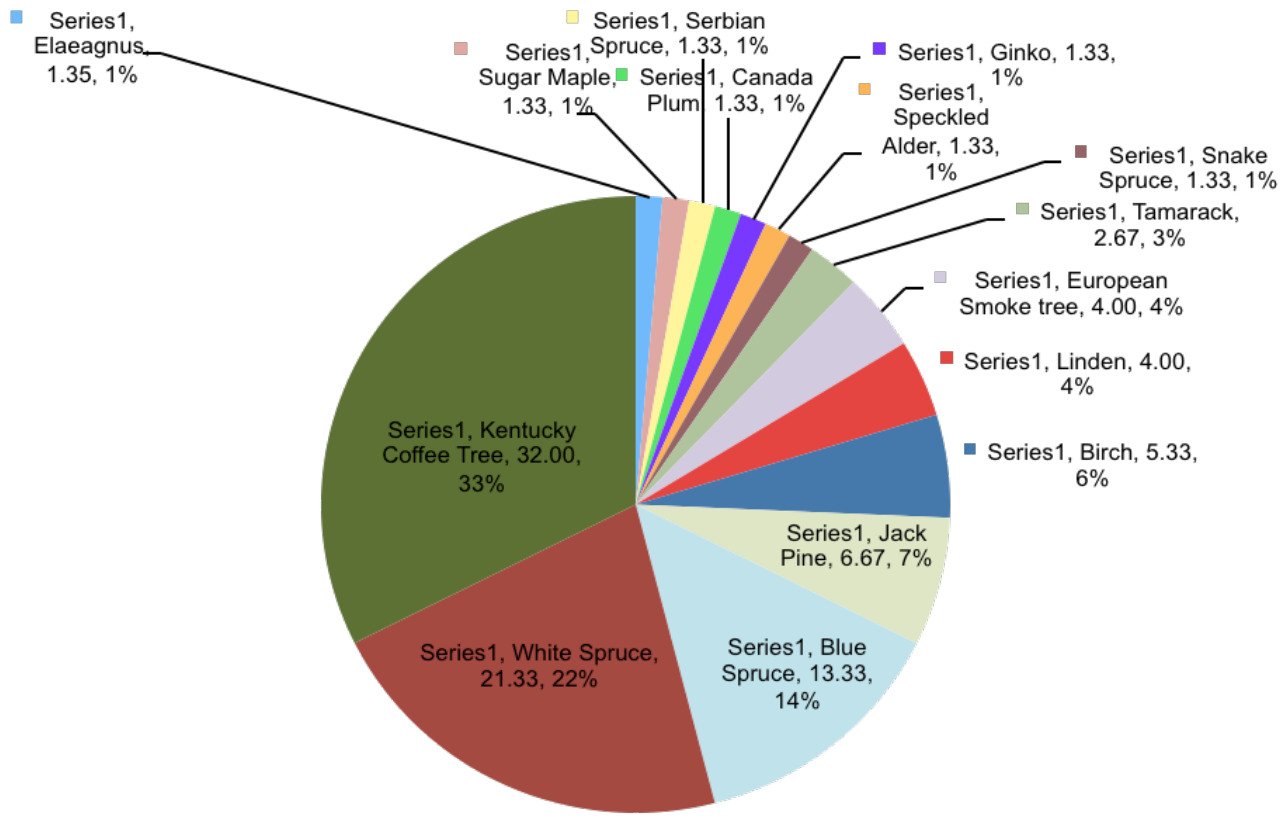


Figure 12. Tree species distribution in 2008 for Peninsula Plot (Plot 2) at Humber Arboretum

A little more than half the plot consists of Kentucky coffee tree, Tree of heaven, Colorado spruce and Hawthorn (Figure 13)

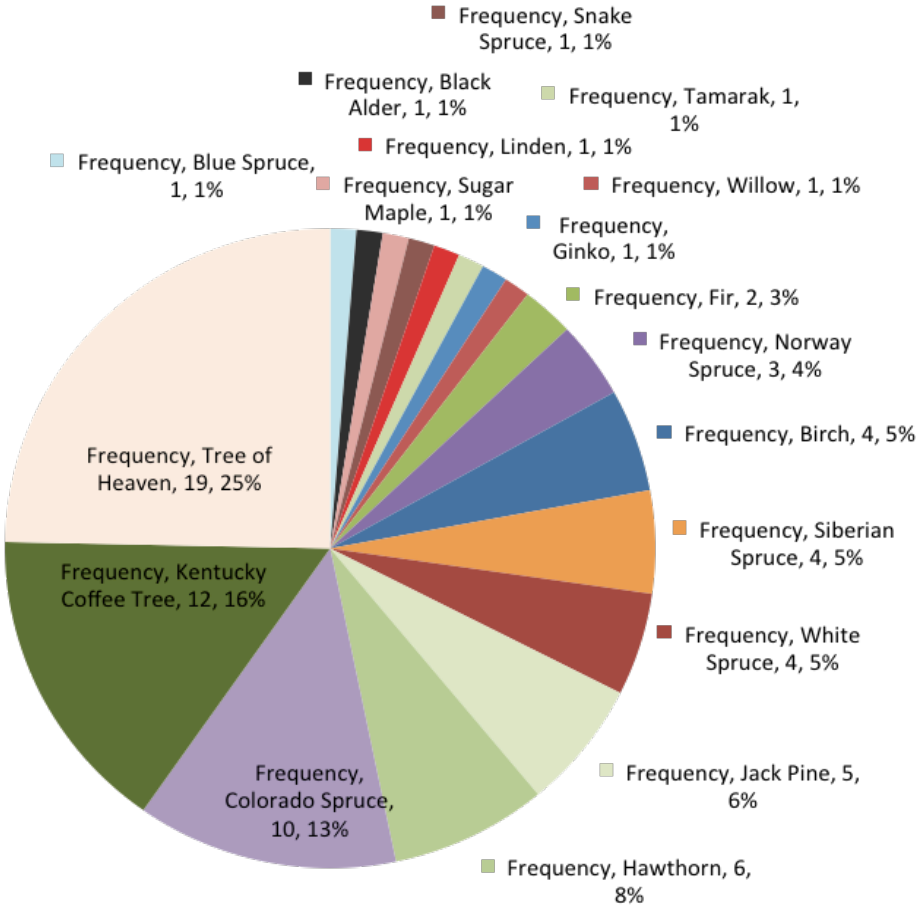


Figure 13. Tree species distribution in 2010 for Peninsula Plot (Plot 2) at Humber Arboretum

Since this plot was planted there are fewer trees in the 4-10 cm diameter class and many more trees that are in the 10-20 cm dbh (Figure 14).

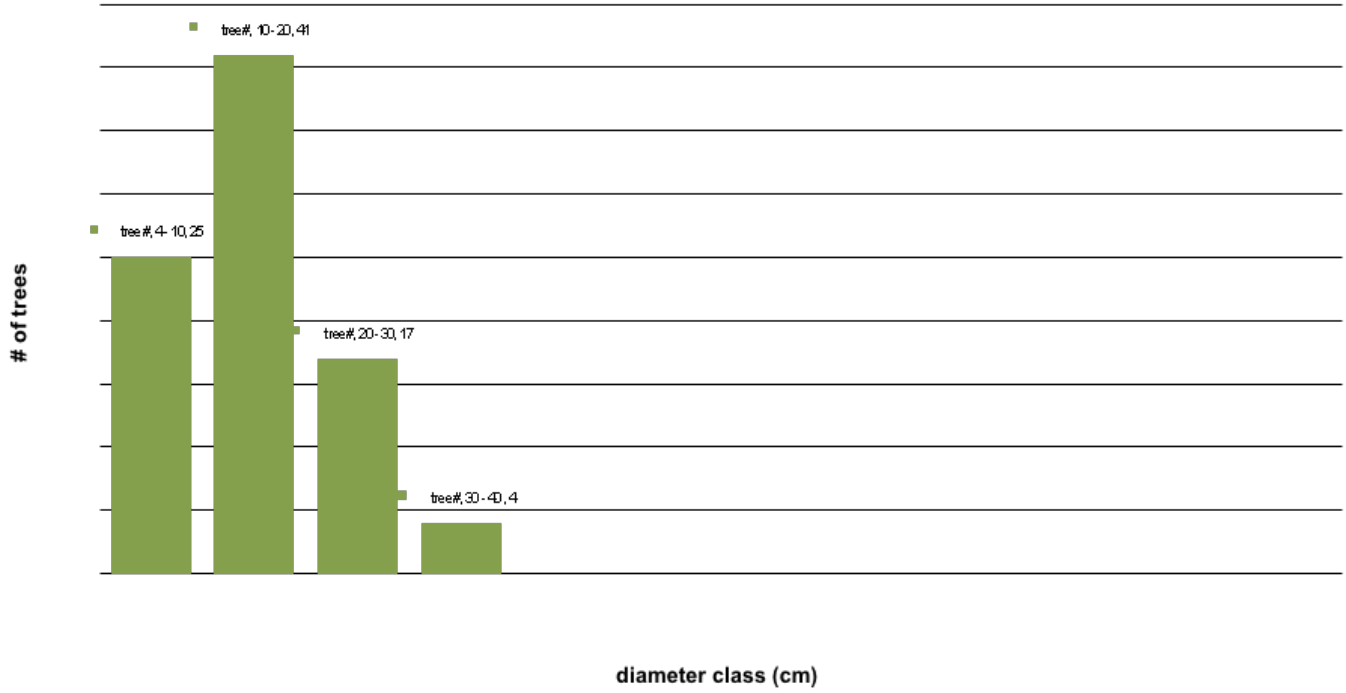


Figure 14. Diameter size class distribution in 2010 of Peninsula Plot (Plot 2) at Humber Arboretum.

Much of the regeneration consists of Kentucky coffee tree (79%) with only three other species, Tree of heaven (17%) and less than 5% are Willow or High-bush cranberry. This indicates that the KCT is very competitive and thus successful in this area (Figure 15).

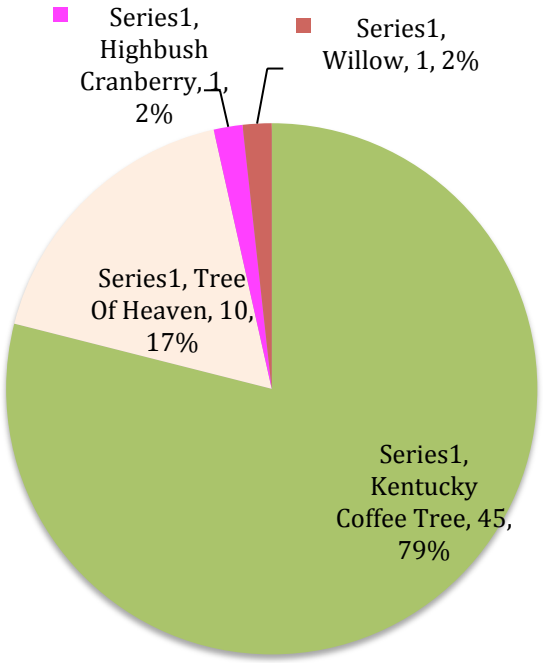
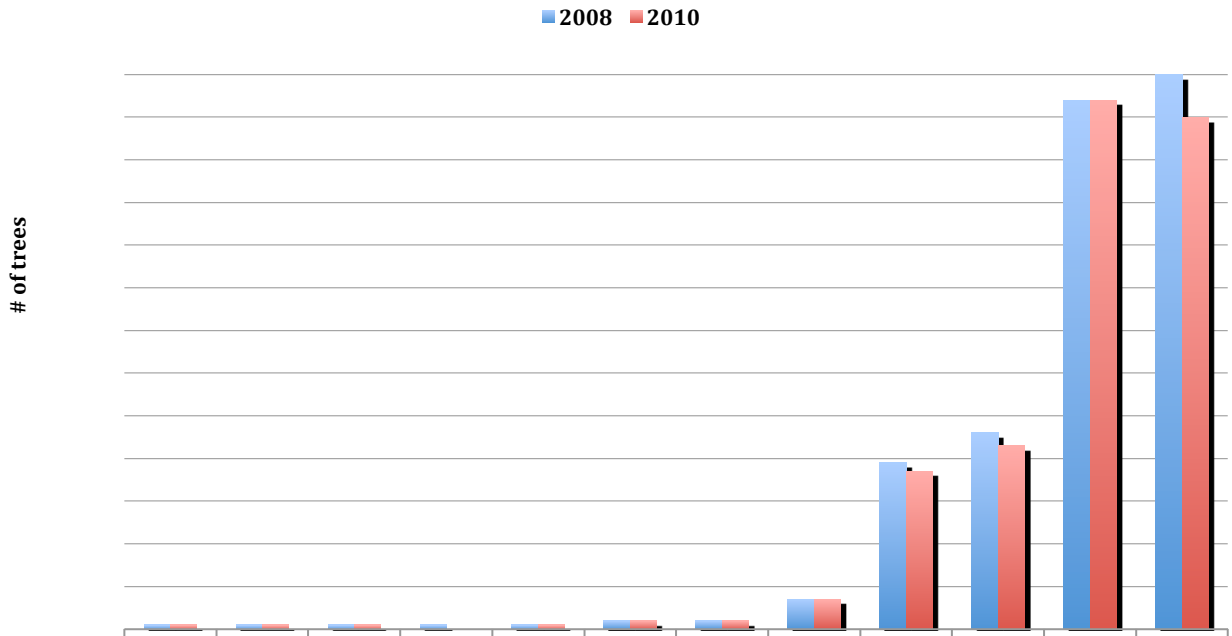


Figure 15. Regeneration species distribution in Peninsula Plot (Plot 2) at Humber Arboretum

Overall, the health of Peninsula Plot 2 was found to be good and invasive re-growth was the lowest of the four plots.

COPSES PLOT (PLOT 4)

There were eight quadrats established in 2008 in the copses area. Quadrat 1 could not be re-measured because of the inconsistency in location. Overall the number of established trees identified in 2008 has decreased (Figure 16). The regeneration trees were not measured.



	Black alder	Burr oak	Honey locust	Pussy Willow	Staghorn sumac	Red pine	Silver maple	White pine	Aspen	White birch	Ash	Black locust
2008	1	1	1	1	1	2	2	7	39	46	124	130
2010	1	1	1	0	1	2	2	7	37	43	124	120

Figure 16. Tree species distribution for Copses Plot 4 at Humber Arboretum

From the diameter class distribution chart it is evident that trees are growing however there appears to be some decline in trees in the 4-10cm diameter class indicating that there has been growth into the next size class and also in mortality (Figure 17). Since regeneration species were not measured it maybe that there are replacement trees in this category. The data on the health of these trees indicates some tree death (Figure 18).

There was little change in the health status of trees from 2008 (Figure 18). There was a slight increase in sick trees and a decrease in dead trees. Similarly, the number of healthy trees increased by a small percentage. It was noted that a high number of trees that were sick were suppressed trees; crowded by taller trees. Sick trees were also noticed along the copse edges where many trees were leaning. This indicates that the removal of both the invasive tree species and the clearing of herbaceous understorey maintained the healthy condition of the trees.

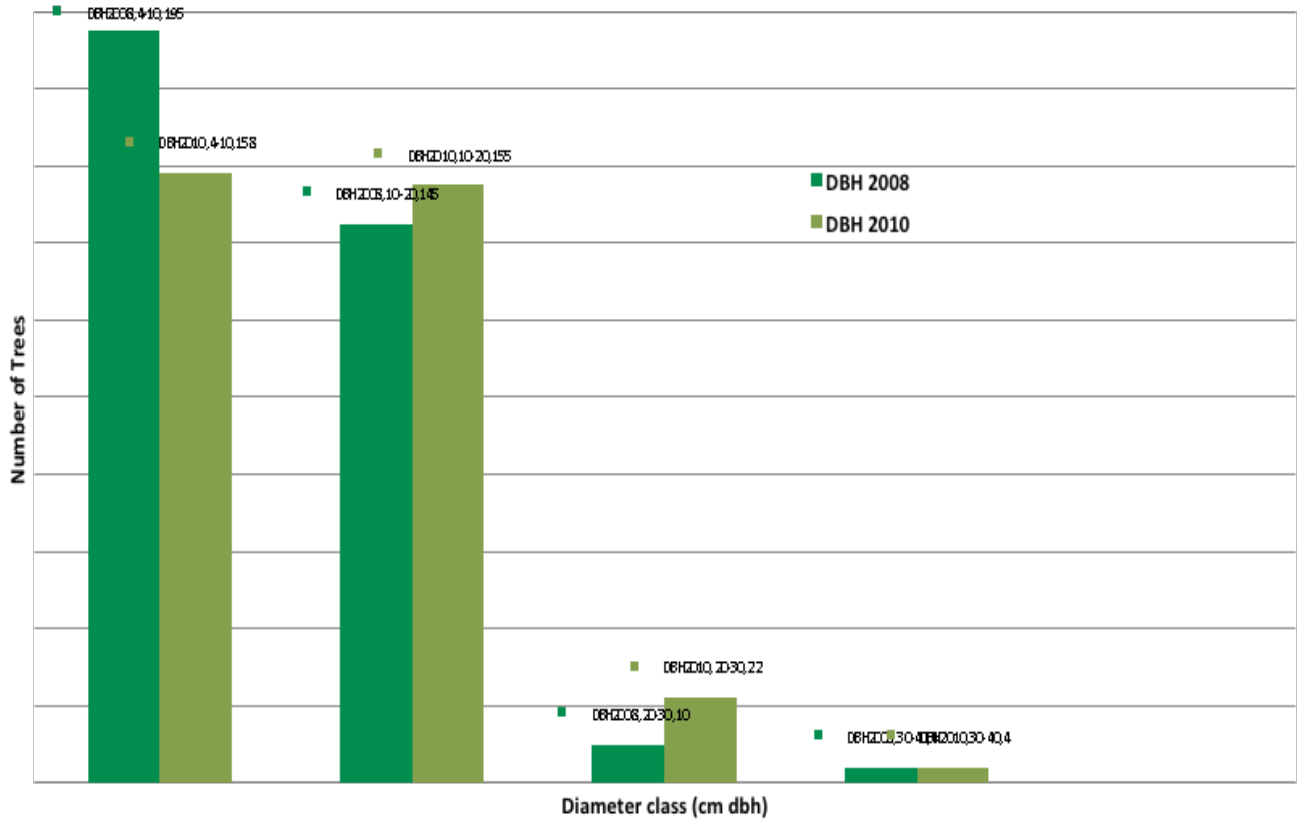


Figure 17. Diameter class distribution of trees in 2008 and 2010 in Copses Plot (Plot 4) at Humber Arboretum

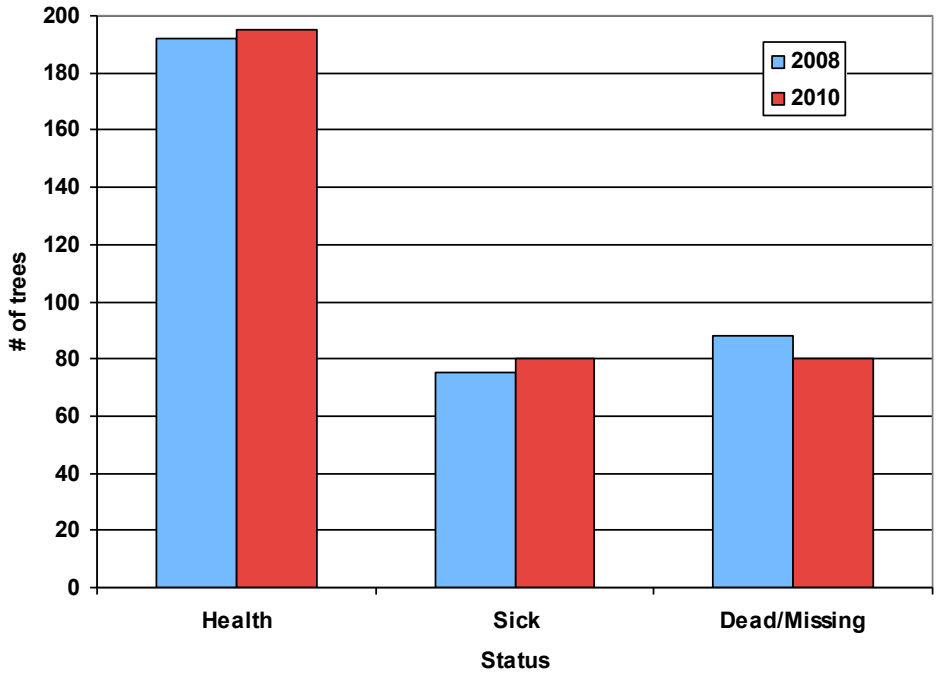


Figure 18: Tree Health Comparison in Copses from 2008 to 2010 in Copses Plot (Plot 4) at Humber Arboretum.

Acknowledgements

ACER expresses appreciation to the following organizations that supported this successful project:

- ✓ Councillor Suzan Hall & the Clean and Beautiful City Fund
- ✓ Human Resources and Skills Development Canada
- ✓ Natural Environment and Community Program - City of Toronto Urban Forestry Division
- ✓ Toronto Region Conservation Authority (TRCA)
- ✓ Rexdale Youth Resource Centre, YMCA
- ✓ Humber Arboretum
- ✓ The Canadian Tree Fund