Woodland Monitoring in Guelph, Ontario

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Vegetation Sampling Protocol (VSP)

Collaborative effort among:

City of Guelph

Ontario

Ontario Ministry of Natural Resources and Forestry

University of Toronto Faculty of Forestry

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Monitoring the Impact of Emerald Ash Borer

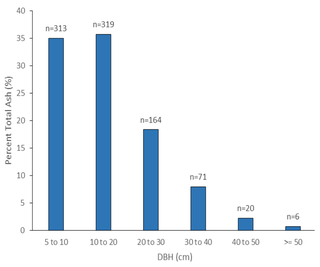
- VSP monitoring was implemented in 2016
  - Proactive response to monitoring natural areas and assessing the impacts and risks due to Emerald Ash Borer (EAB) (*Agrilus planipennis*)
  - EAB was first detected in Guelph in 2011

Native Ash trees, found in a wide variety of forest and habitat types, are vital to Guelph's natural areas and urban forest.

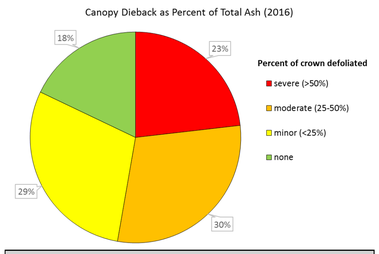
- Ash is found at 83.5% of sampled plots
- It is a significant component of the total tree count, relative abundance, biomass, and canopy cover
- Sampled woodlands have ~28,000 Ash trees (DBH ≥ 5cm)

Source: https://www.ontario.ca/page/emerald-ash-borer

~70% of City-owned woodlands sampled



DBH distribution of Ash trees in sampled plots (2016), where n refers to the number of trees measured within a specified diameter range.

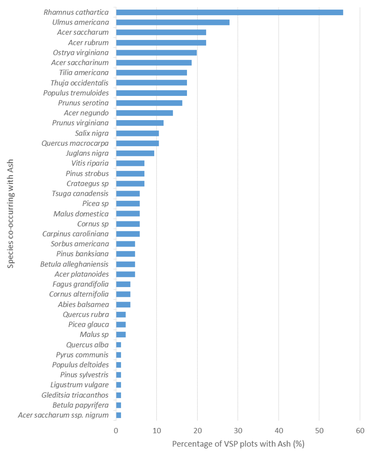


Defoliation was observed at 82% of Ash trees. However, a few trees might be suitable for *TreeAzin* injection (DBH > 20cm with no canopy dieback).

Impacts of EAB and Ash tree mortality

- Loss of native species diversity
- Colonization by invasive species (e.g. Buckthorn)
- Inhibited forest regeneration
- Reduced carbon storage sequestration
- Indirect impacts: soil erosion, stream sedimentation and warming

VSP enables EAB impacts to be quantified and high risk areas identified, informing Guelph's EAB and Forest Management Plans.



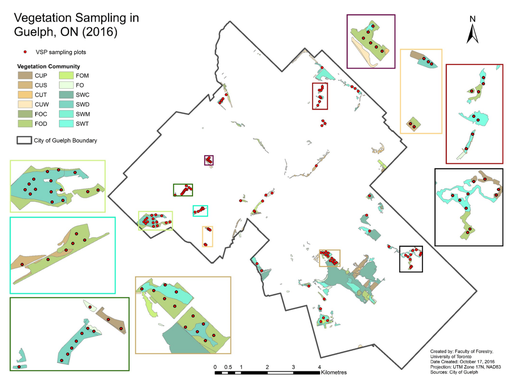
Frequency of woody species co-occurring with Ash. With no intervention the most likely Ash replacements are Buckthorn, American Elm, Maples and Basswood.

Establishing a Monitoring Network in Guelph

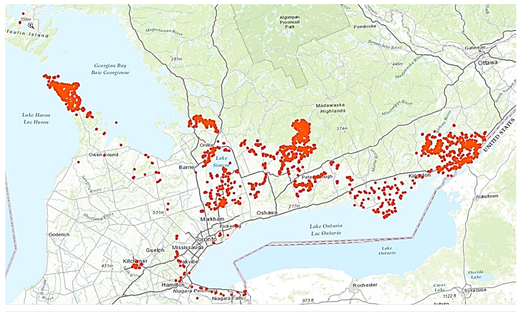
Vegetation Sampling Protocol (VSP) *was used to sample City-owned woodlands in 2016.*

- VSP is rigorous, yet adaptable and replicable through space and time
- VSP data supports and informs:
  - Landscape planning
  - Adaptive forest management
  - Invasive species management
  - Restoration planning and monitoring
  - Species at risk recovery planning and habitat management
  - Carbon budgeting
  - Estimates of ecological goods and services
  - Detecting and measuring vegetation change

EAB impacts were assessed at the tree and woodlot scale. All sampled plots were staked for longer term monitoring.

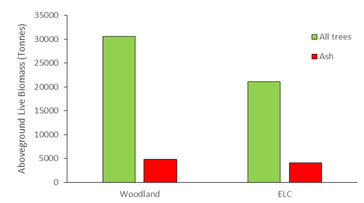


A total of 103 plots were sampled across the City owned woodlands. Sampling was done in 27 natural areas and across10 vegetation communities.

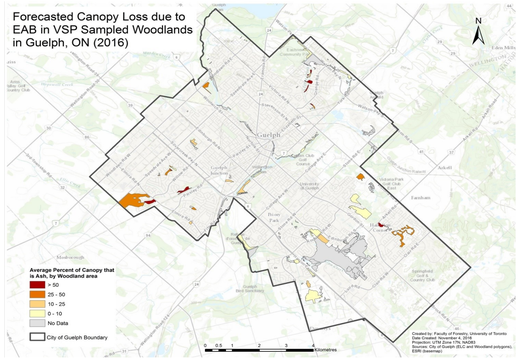


Guelph's VSP monitoring plots are part of the larger VSP network in southern Ontario.

About 59% of Guelph's woodland cover is swamp forest, while 23% is upland, 13% is cultivated, and the remaining 5% is unclassified.



Ash mortality could result in the release of CO_2 equivalent to a year's emissions from ~2,000 cars (US EPA 2014).

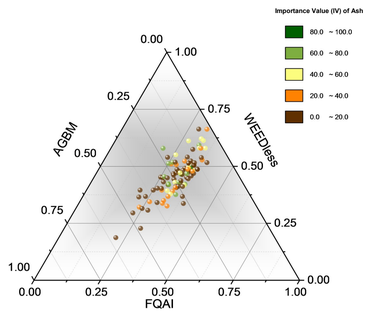


On average 27% of the **woodland canopy** could be open due to Ash loss. Some woodland stands could lose their entire canopy or 100% of their trees.

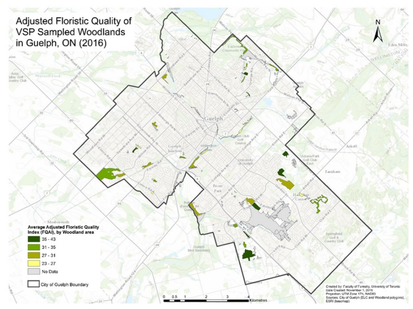
Mitigating the Impacts

- Continue monitoring every 5 years
- Forest regeneration can be facilitated by tree planting
- Invasive species management necessary to prevent impacts on regeneration and native species diversity
- Removal of Ash deadwood recommended only where there is a safety concern or high amount of dead biomass on the ground

Priority areas for conservation are stands with abundance of Ash (e.g. high canopy cover), high floristic quality, and low invasive species.



Ash Importance Value plotted against indicators of forest structure and composition. Above Ground Biomass (AGBM), Adjusted Floristic Quality Index (FQAI) and WEEDless Index can be used to set management priorities.

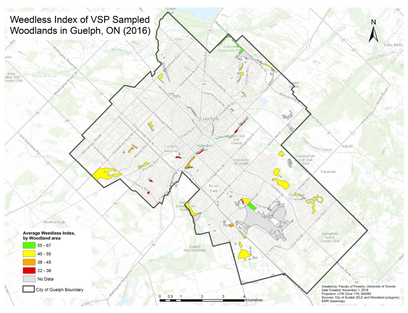


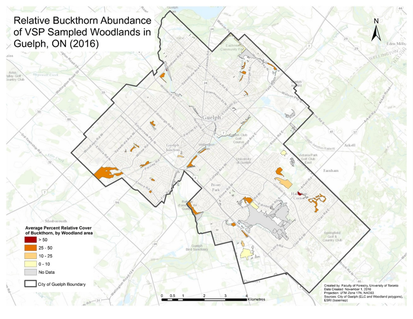
High **FQAI** values indicate better floristic quality. *FQAI > 35 indicates high woodland quality.*

Species Richness observed per plot ranges from 10-61 species.

High **WEEDless** values indicate better quality and fewer weeds and invasive plants.

Non-native species are found at 99% of plots. EAB is expected to also facilitate the spread of invasive plants.





Common Buckthorn is found at 92.2% of plots and Garlic Mustard is found at 51.1% of plots. Invasive plants like Buckthorn could become the dominant species in the future and suppress forest regeneration.