



Sampling urban trees for EAB: Developing an early-detection tool

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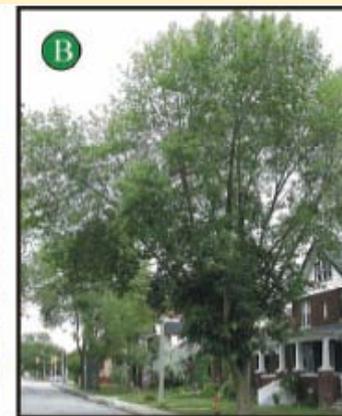
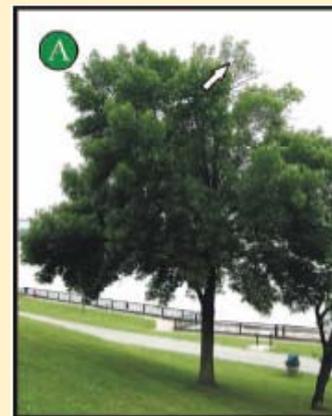




Problem

- ✦ Detected in 2002, BUT probably in ON and MI since early 1990s

- ✦ Difficult to detect new infestations
 - Cryptic life stages under the bark
 - 1 year life cycle (possibly 2?)
 - Delay in onset of signs/symptoms
 - Heavily-infested trees
 - High #'s emerging beetles





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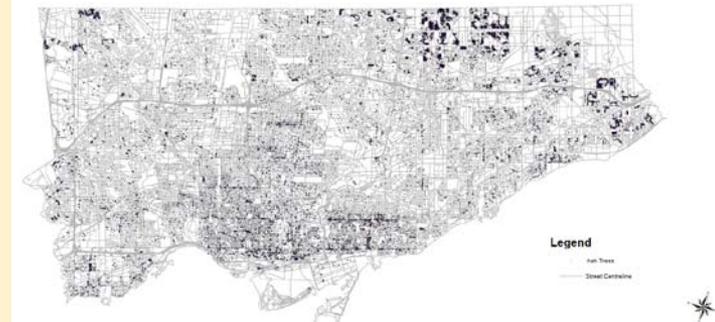


Concern in urban forests

- ✦ Extensive trade and movement of materials: risk of introduction
- ✦ High levels of stress in urban trees
- ✦ Often even-aged monocultures
- ✦ \$3-10 billion: estimated cost of ash treatment, removal & replacement (Sydnor et al. 2007; Kovacs et al. 2010)
- ✦ Need effective and efficient sampling tool for **early detection**



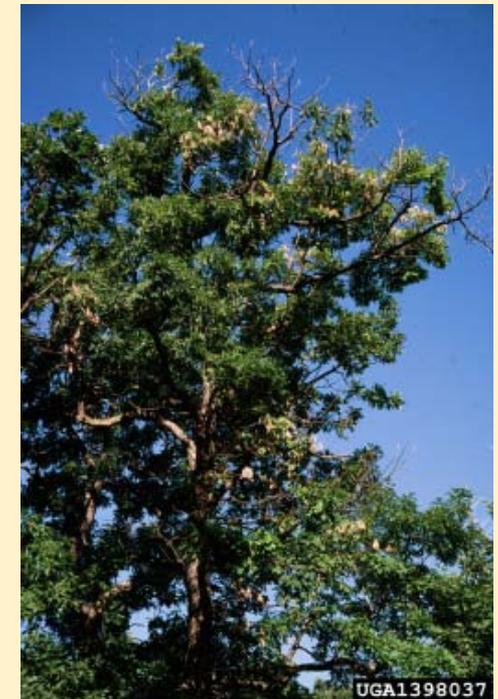
 **TORONTO** > 100 000 ash trees
Parks, Forestry & Recreation





Hypothesis

- ✦ Infestation begins in crown of semi-mature open-grown ash
- ✦ Within-tree distribution of bronze birch borer and two-lined chestnut borer
- ✦ Preferences by EAB for diameter and bark thickness





Sampled **97** trees
with **NO** signs or
symptoms of attack
(close to known EAB)



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Alma R & D
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Alma I
Winter Parking
Premier Institute

Monitek M221015







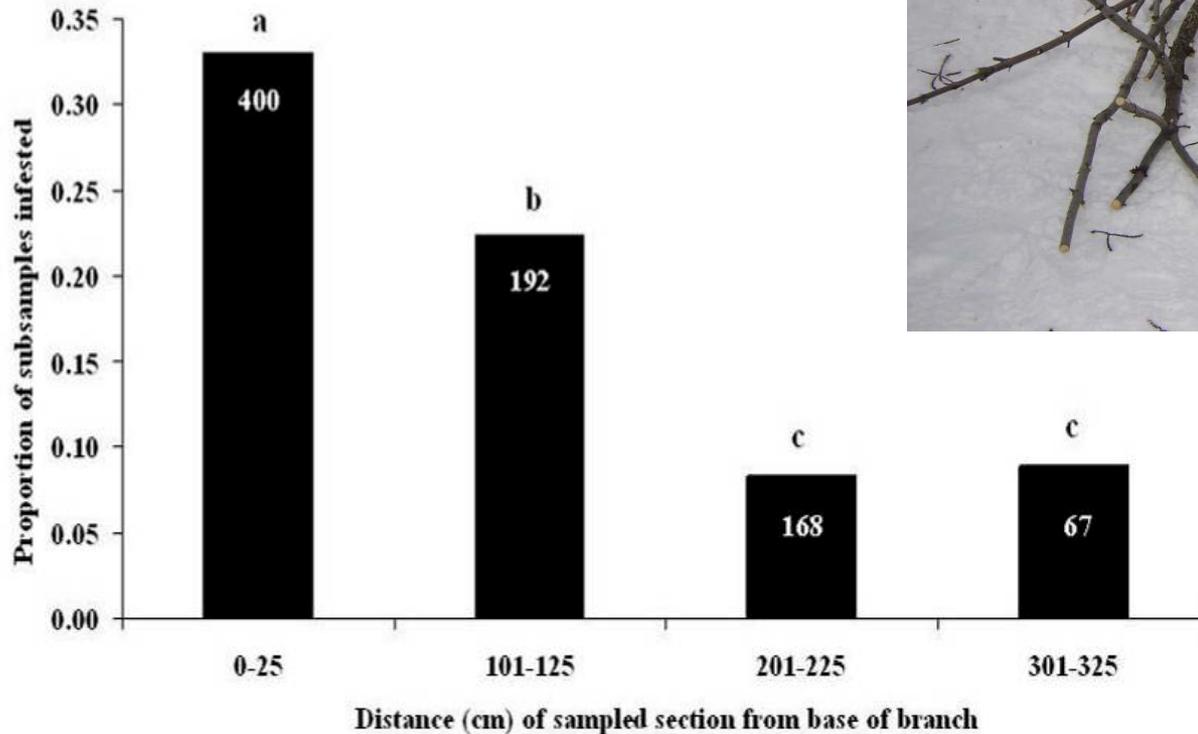


50% of the asymptomatic trees were found to be infested....

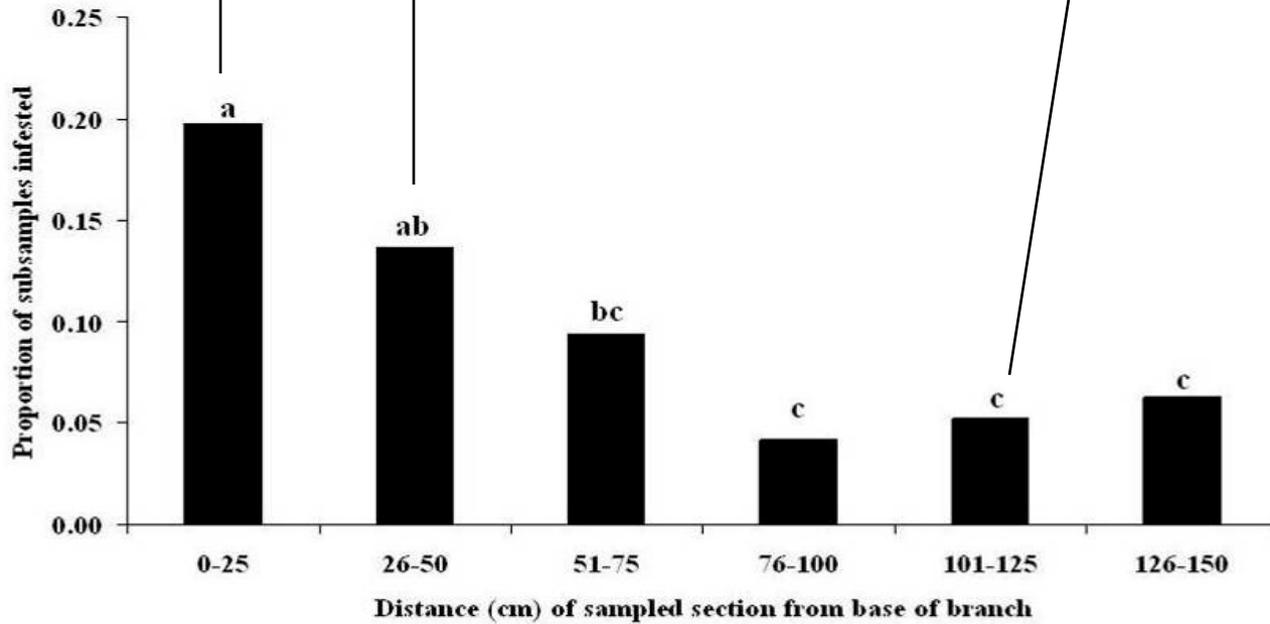




Within-branch

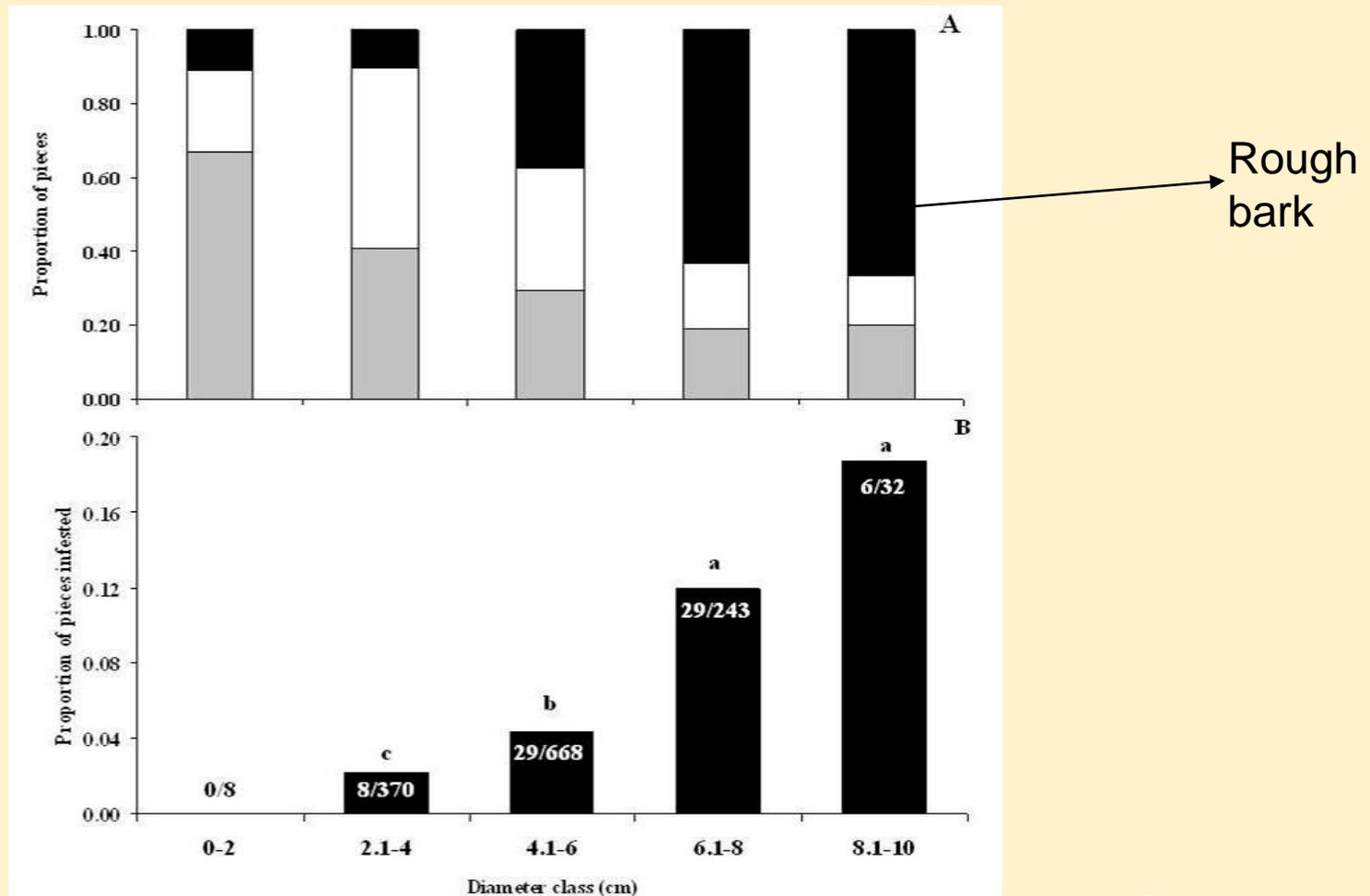


Refining sample unit



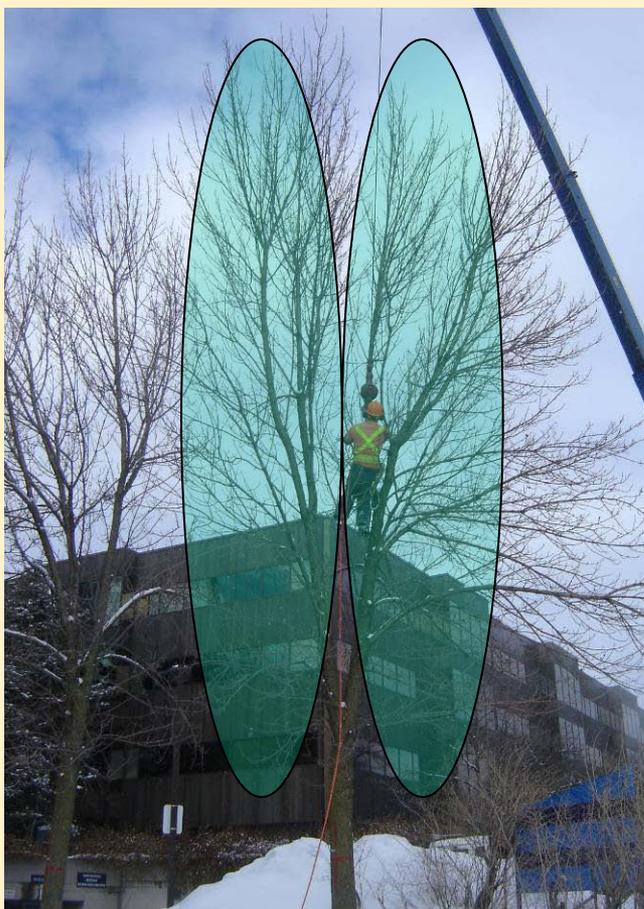


Bark roughness (A) and Branch diameter (B)



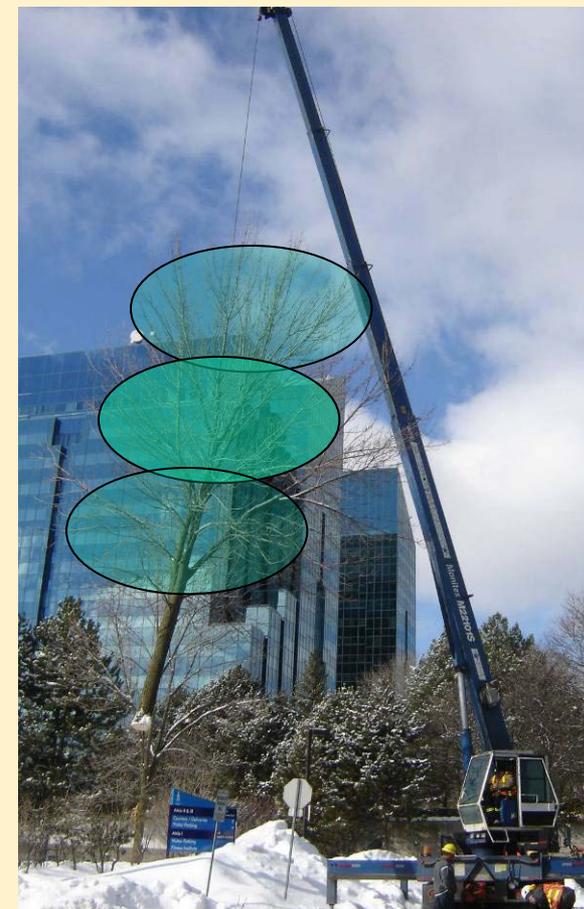


Within-crown probability of detection



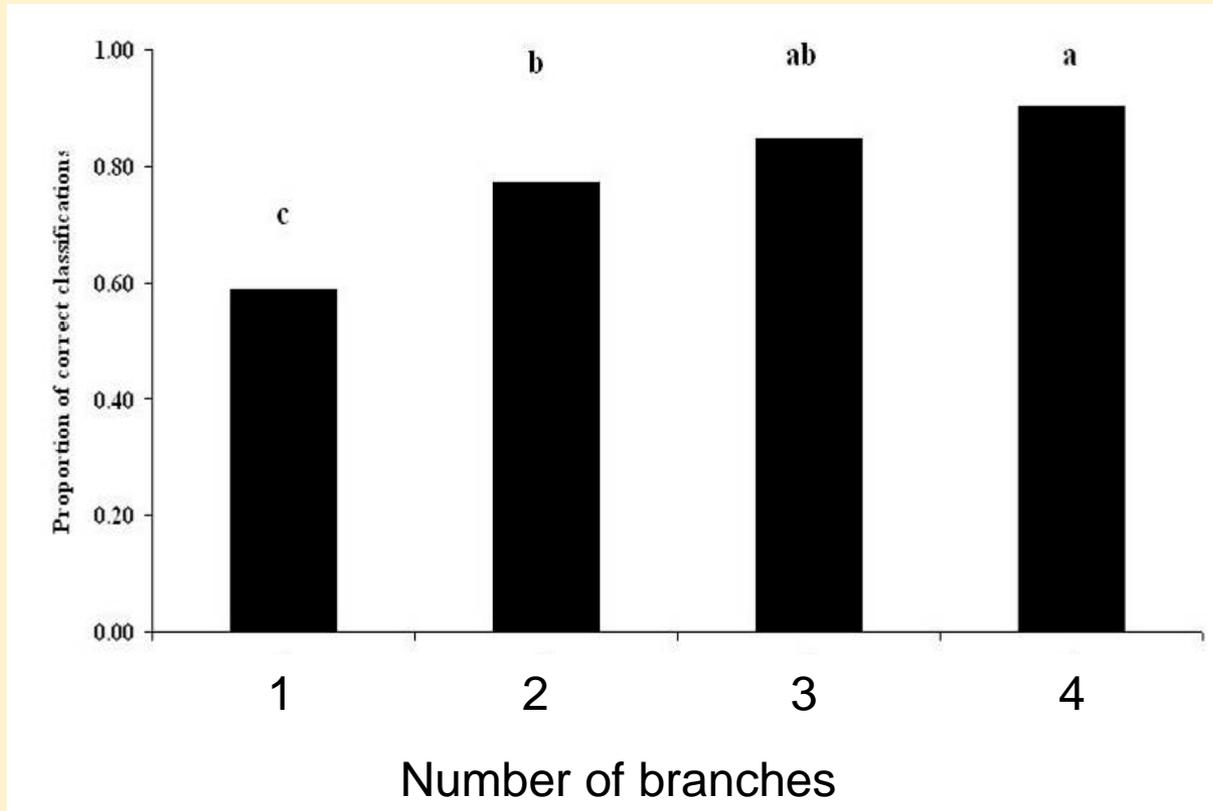
North 0.62
South 0.77

Upper 0.48
Mid 0.77
Lower 0.58



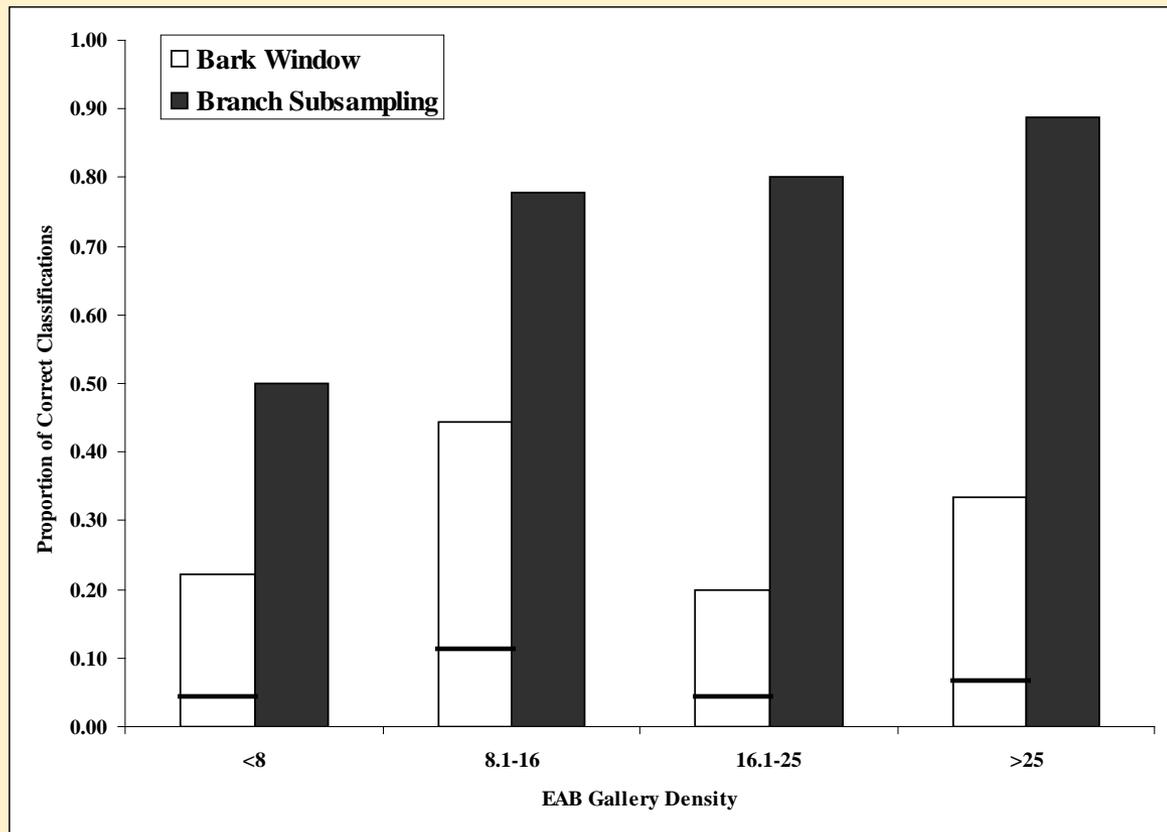


Optimal sample size per tree: TWO branches





Probability of detection varies among methods and with EAB density



Recommended method

- Open grown, semi-mature trees
- 20 -50 cm DBH
- **Two** branches per tree
- Branches: min. 5-8 cm diameter
- Mid crown, south aspect
- ONE 50-cm sample per branch
- 80% probability of detection

Detection of Emerald Ash Borer in Urban Environments Using Branch Sampling

K. L. Ryall, J. G. Fidgeon, J.J. Turgeon

The emerald ash borer (EAB), *Aglyptinus planipennis* Fairmaire (Fig. 1), a non-native insect pest of Asian origin, presently infests large numbers of ash (*Fraxinus* spp.) trees in Ontario and Quebec, and could soon spread to other provinces.



Fig. 1. Adult emerald ash borer



Fig. 2. Healthy-looking ash trees with no visible sign or symptom, but determined to be infested with EAB using branch sampling.

One of the many requirements for effective management of EAB is early detection of infestations, when densities are still low and before signs and symptoms are obvious. Visual surveys rely on external signs and symptoms (e.g., exit holes, larval tunnels seen through cracks in the bark, feeding by woodpecker or squirrels) that may not be noticeable for 2 to 3 or more years after the arrival of the population, particularly if the infestation begins in the upper part of the tree. Sticky traps baited with an attractant have the potential to detect EAB adults in an area before signs or symptoms become visible, but may not necessarily provide information on the infestation status of individual trees.

Ryall et al. (2010) sampled many ash trees with no obvious signs or symptoms of EAB attack (Fig. 2) and showed that branch sampling was an effective method of detecting EAB-infested trees; indeed, 74% of the infested trees would have been discovered if the method described below had been used. The purpose of this note is to describe this basic sampling technique.

Canada



Fig. 4. Cutting (a), measuring and trimming (b) ash branches. Branches, cut to a length of 75 cm, are placed in a vise and bark is whittled off the basal 50 cm (c) (1.5 m piece shown here). Whittling removes bark in thin 1-2 mm strips (d).

ADDITIONAL READING

de Groot, P., Biggs, W.D., Lyons, D.B., Scarr, T., Czerwinski, E., Evans, H.J., Ingram, W. and Marchant, K. 2006. A visual guide to detecting emerald ash borer damage. Natural Resources Canada, Canadian Forest Service, Great Lakes Forestry Centre, 16 pages.

Lyons, D.B., Caister, C., de Groot, P., Hamilton, B., Marchant, K., Scarr, T., and Turgeon, J.J. 2007. Survey guide for detection of emerald ash borer. Natural Resources Canada - Canadian Forest Service and Canadian Food Inspection Agency, Sault Ste. Marie, Ontario, Canada.

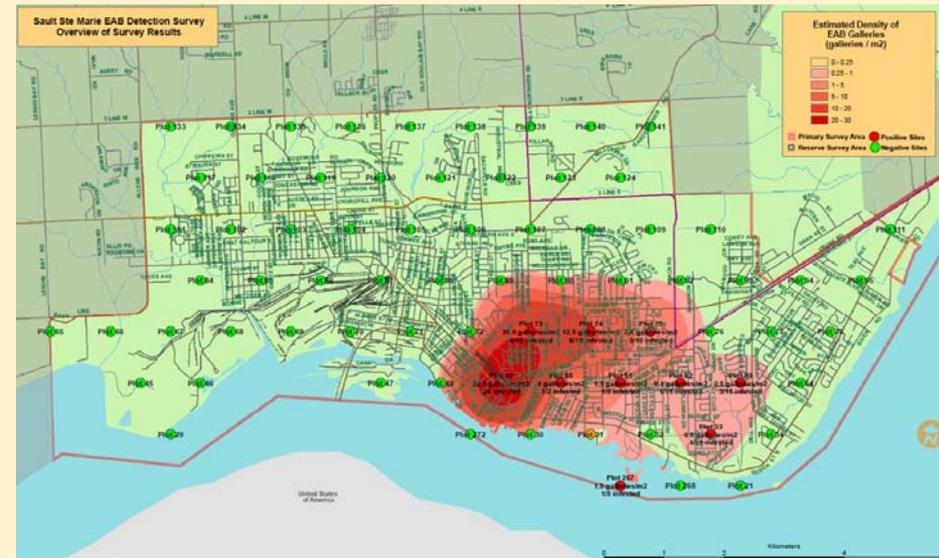
Ryall, K.L., Fidgeon, J.G., and Turgeon, J.J. 2010. Development of a sampling unit for early detection of the emerald ash borer, *Aglyptinus planipennis*, in individual urban trees. Unpublished.





Ongoing research

- ✦ Optimizing sampling to quantify EAB density
- ✦ Area-wide detection and delimitation surveys



Questions?



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CFS OMNR CFIA

