

Emerald Ash Borer

Biology and Epidemiology

Chris MacQuarrie
Canadian Forest Service
Great Lakes Forestry Centre
cmacquar@nrcan.gc.ca

 [@cmacquar](https://twitter.com/cmacquar)



Natural Resources
Canada

Ressources naturelles
Canada

Canada 

Introduction & Spread





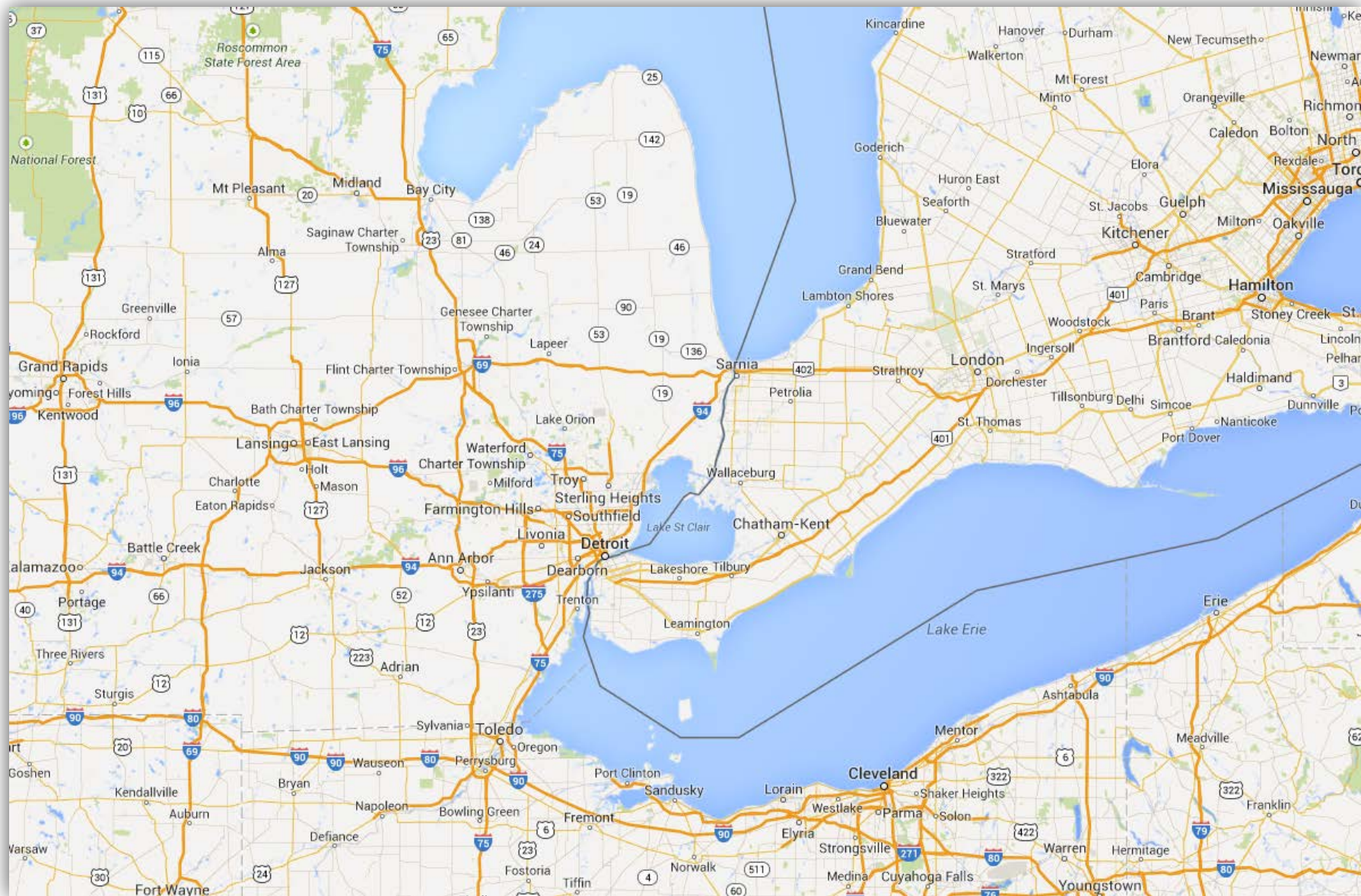
CC Image courtesy sallaha on Flickr



Natural Resources
Canada

Ressources naturelles
Canada

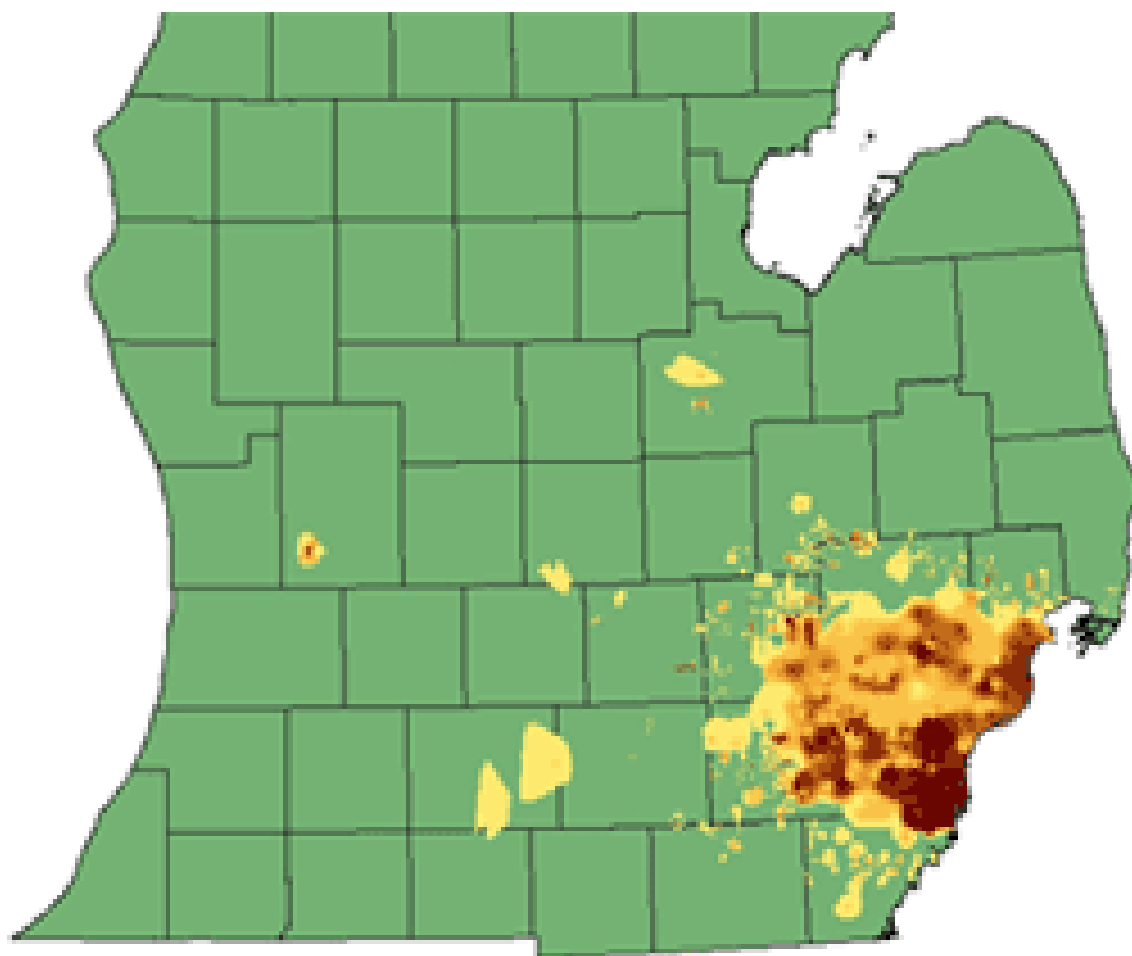
Canada



Natural Resources
Canada

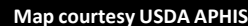
Ressources naturelles
Canada

Canada



**Emerald ash borer density
in southern Michigan, 2003.**





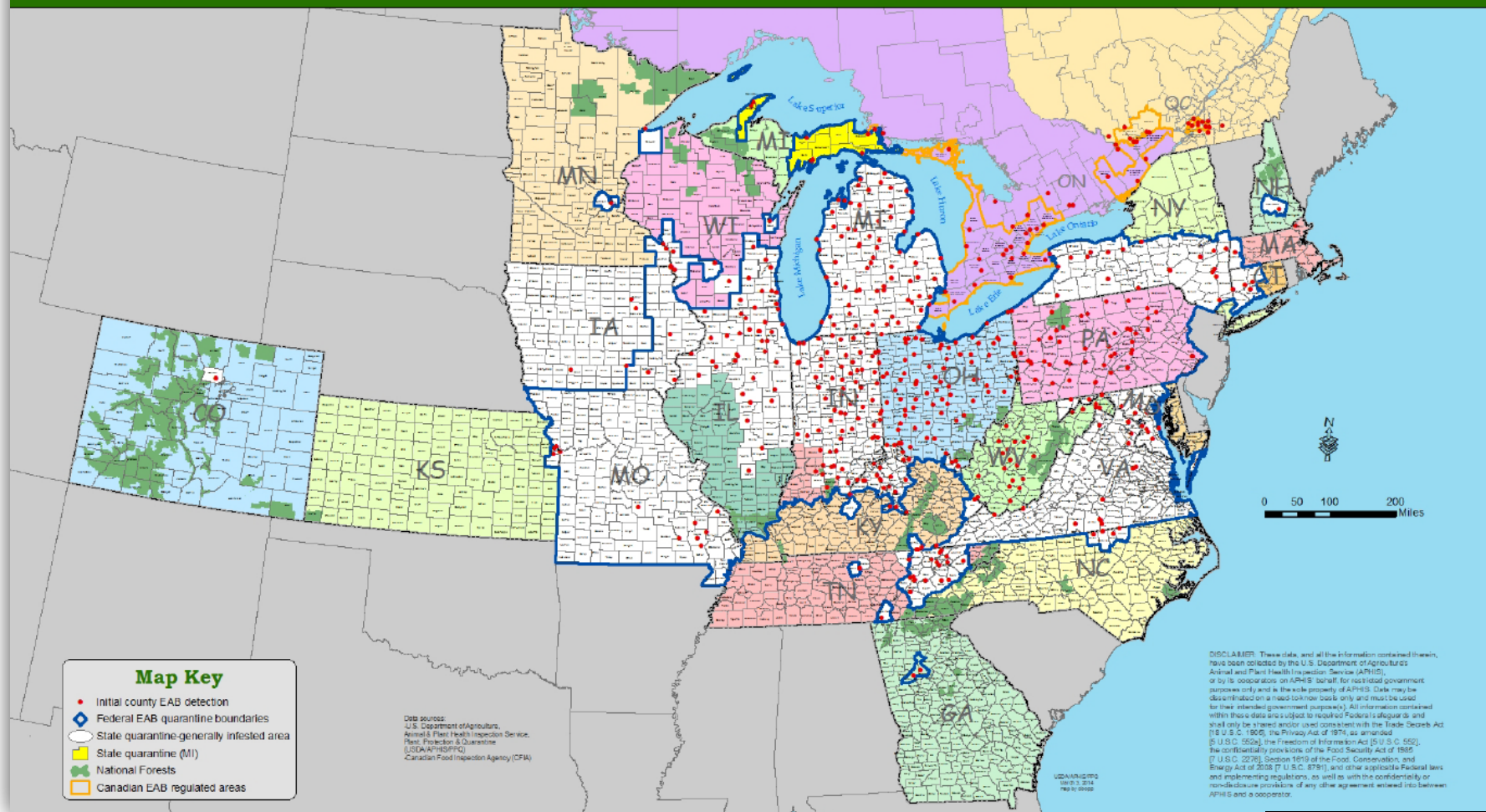


United States
Department of
Agriculture

Cooperative Emerald Ash Borer Project

Initial county EAB detections in North America

March 3, 2014



Map courtesy USDA APHIS



Natural Resources
Canada

Ressources naturelles
Canada

Canada

Life Cycle & Hosts

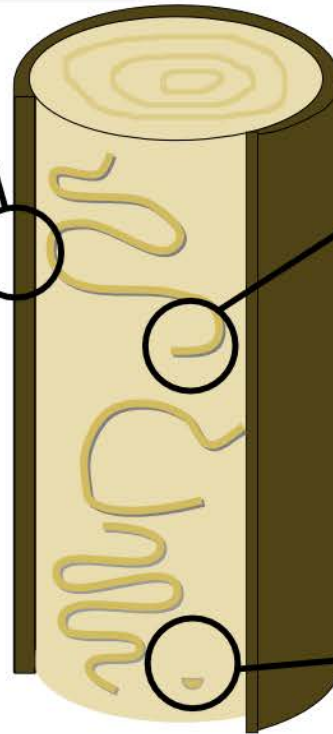




Summer



Fall



Spring





Green



CC Image courtesy J O'Brien
USDA FS on Bugwood.org

UGA5038083

White



Natural Resources
Canada

Ressources naturelles
Canada

Canada

Manchurian



Image from: <http://www.ag.ndsu.edu/hort/info/treeshrub/decidtrees.htm>

Blue



CC Image courtesy T D Snyder
OSU on Bugwood.org

5500360



Natural Resources
Canada

Ressources naturelles
Canada

Canada



Mountain Ash



CC Image T DeGomez
UArizona on Bugwood.org

5390023

Walnut



CC Image R Webb
on Bugwood.org

UGA1480230



Natural Resources
Canada

Ressources naturelles
Canada

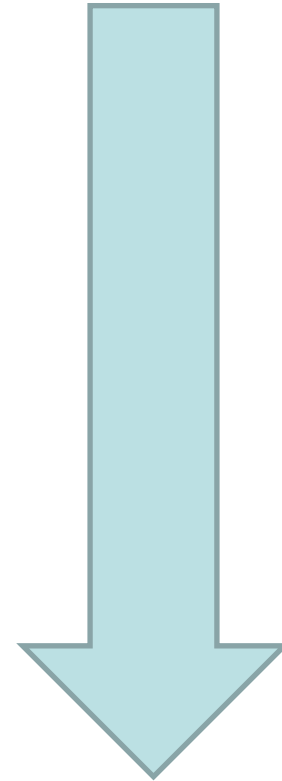
Canada

Tree Attack & Mortality





top down



Natural Resources
Canada

Ressources naturelles
Canada

Canada



small
tree



large
tree



Natural Enemies & Other Mortality





Natural Resources
Canada

Ressources naturelles
Canada

Canada

Tree Resistance



CC Image E Czerwinski
OMNR on Bugwood.org

UGA1439007



Natural Resources
Canada

Ressources naturelles
Canada

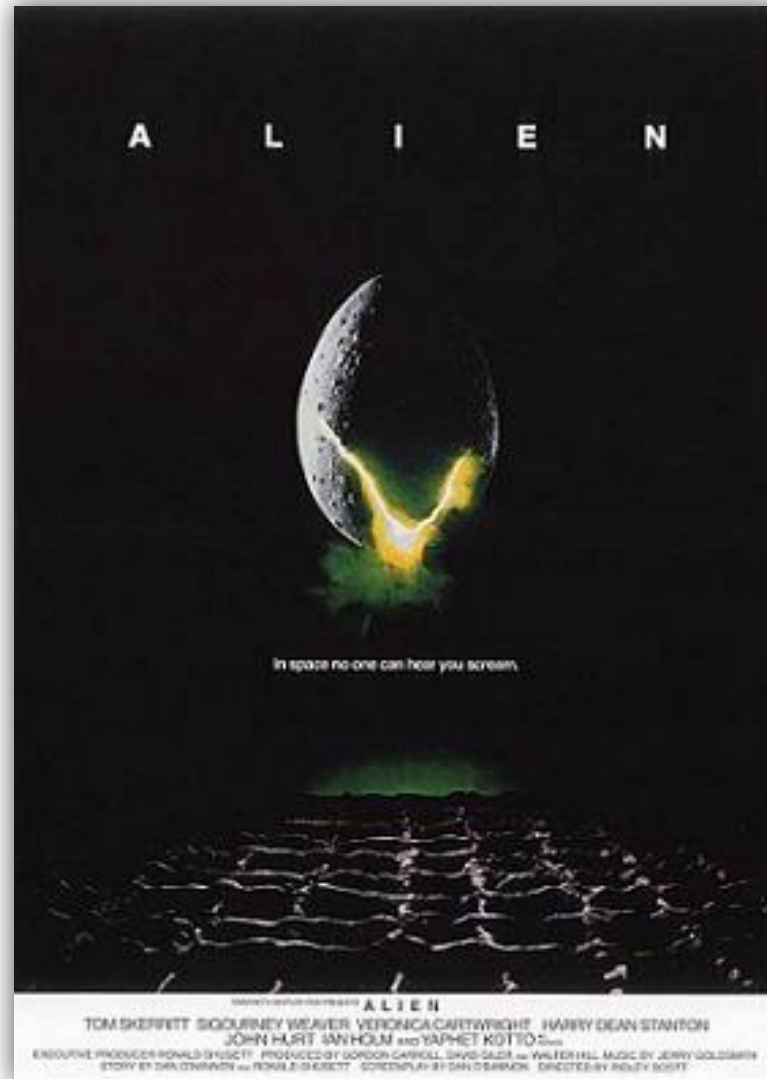
Canada



Predators



Parasitoids



Natural Resources
Canada

Ressources naturelles
Canada

Canada

Parasitoids



Image: L Timms



Natural Resources
Canada

Ressources naturelles
Canada

Canada



Native parasitoids



Images: B Lyons



Natural Resources
Canada

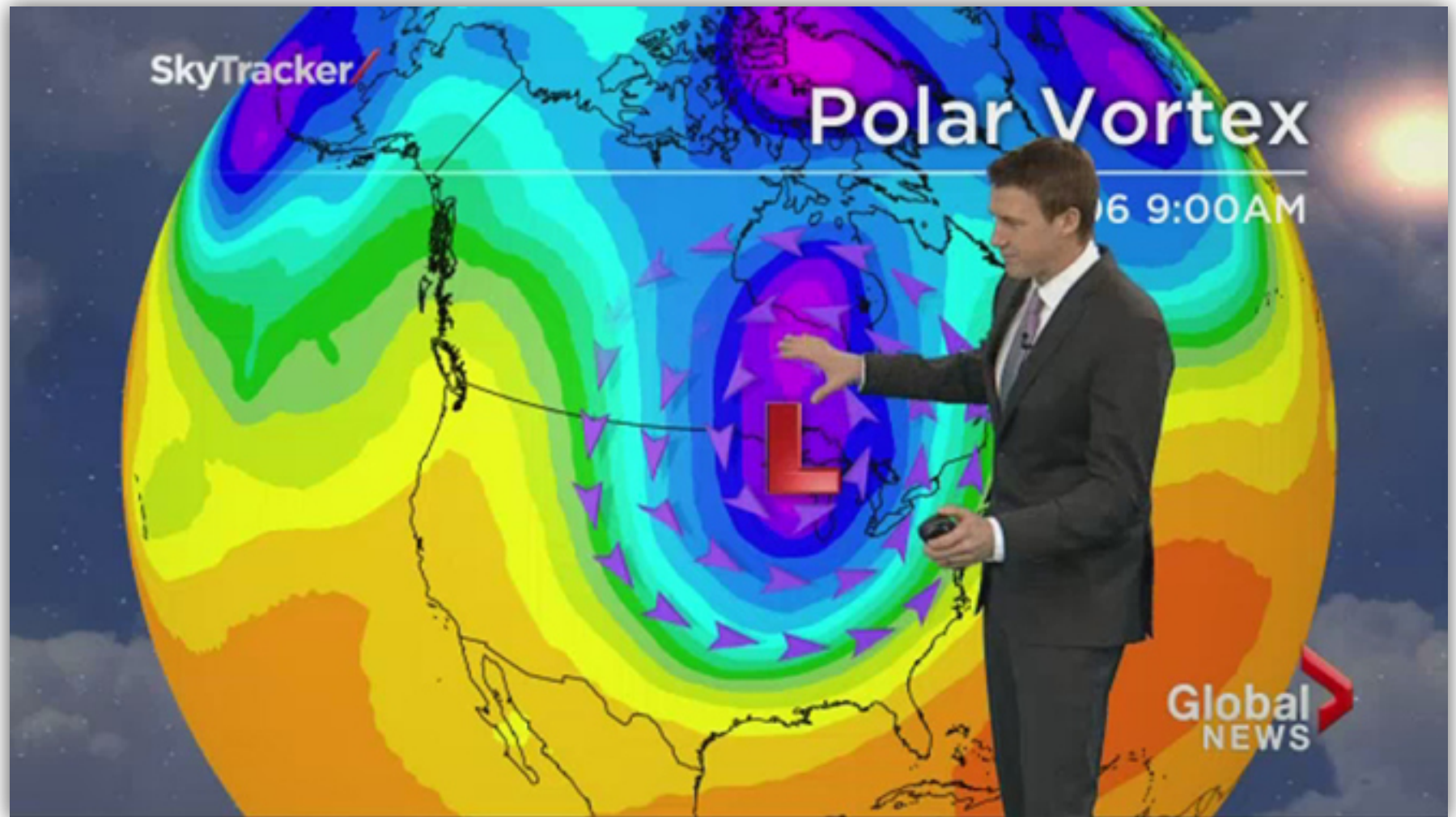
Ressources naturelles
Canada

Canada

Introduced parasitoids (biological control)



abiotic



Natural Resources
Canada

Ressources naturelles
Canada

Canada



Summary

- Introduced & spread via wood packaging, firewood and infested hosts
- 1 to 2 year lifecycle
- All native ash are susceptible
- Top down pattern of infestation
- Some natural controls



More information:

<http://www.emeraldashborer.info/>

<http://www.invasiveinsects.ca/>

<https://www.nrcan.gc.ca/forests/insects-diseases/13377>

(or Google: “NRCan EAB”)

<http://www.inspection.gc.ca/plants/plant-protection/insects/emerald-ash-borer/eng/1337273882117/1337273975030>

(or Google: “CFIA EAB”)



Canada