



Eastern Ontario Model Forest General Meeting

Collaborating to Manage Forest-Health Threats

19 June 2019

Paul Hetzler

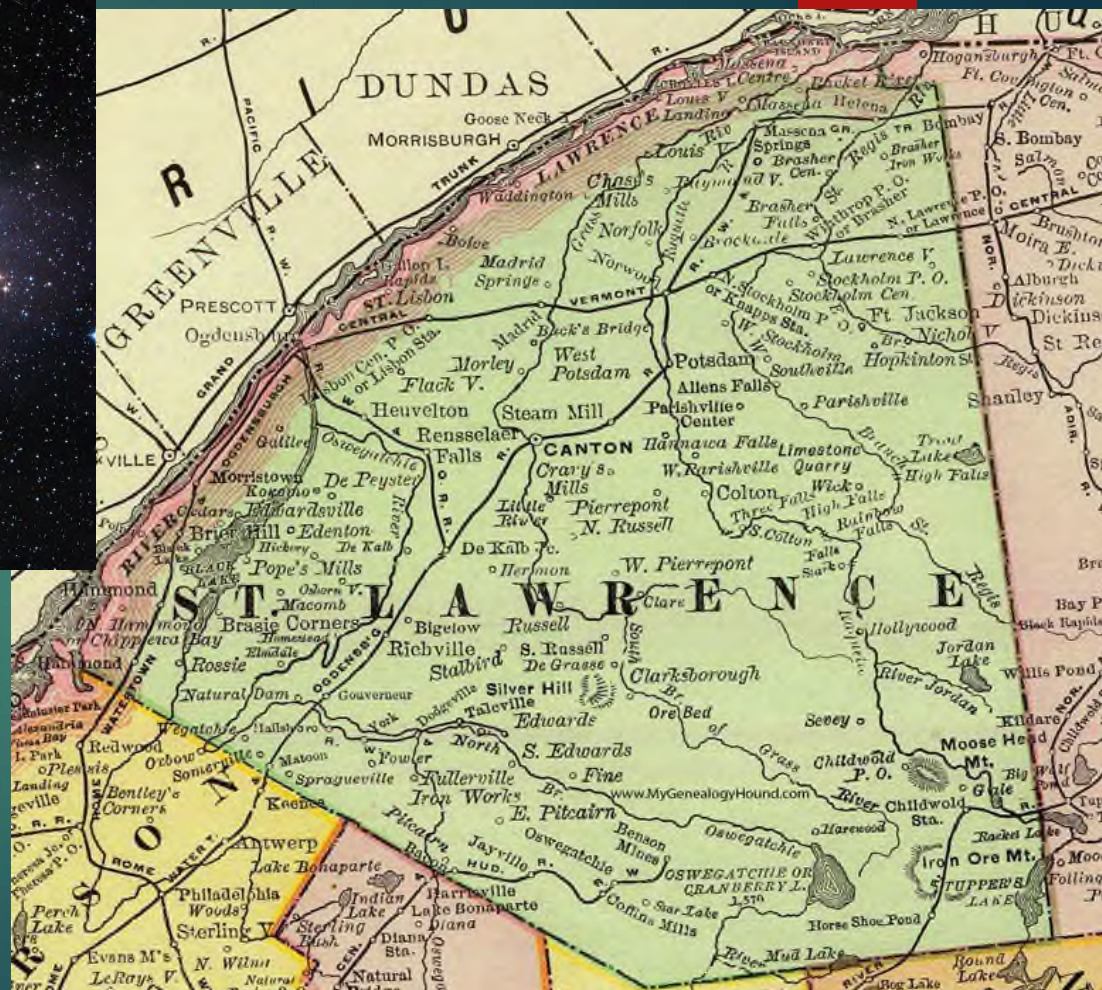
**Cornell Cooperative Extension
of St. Lawrence County**

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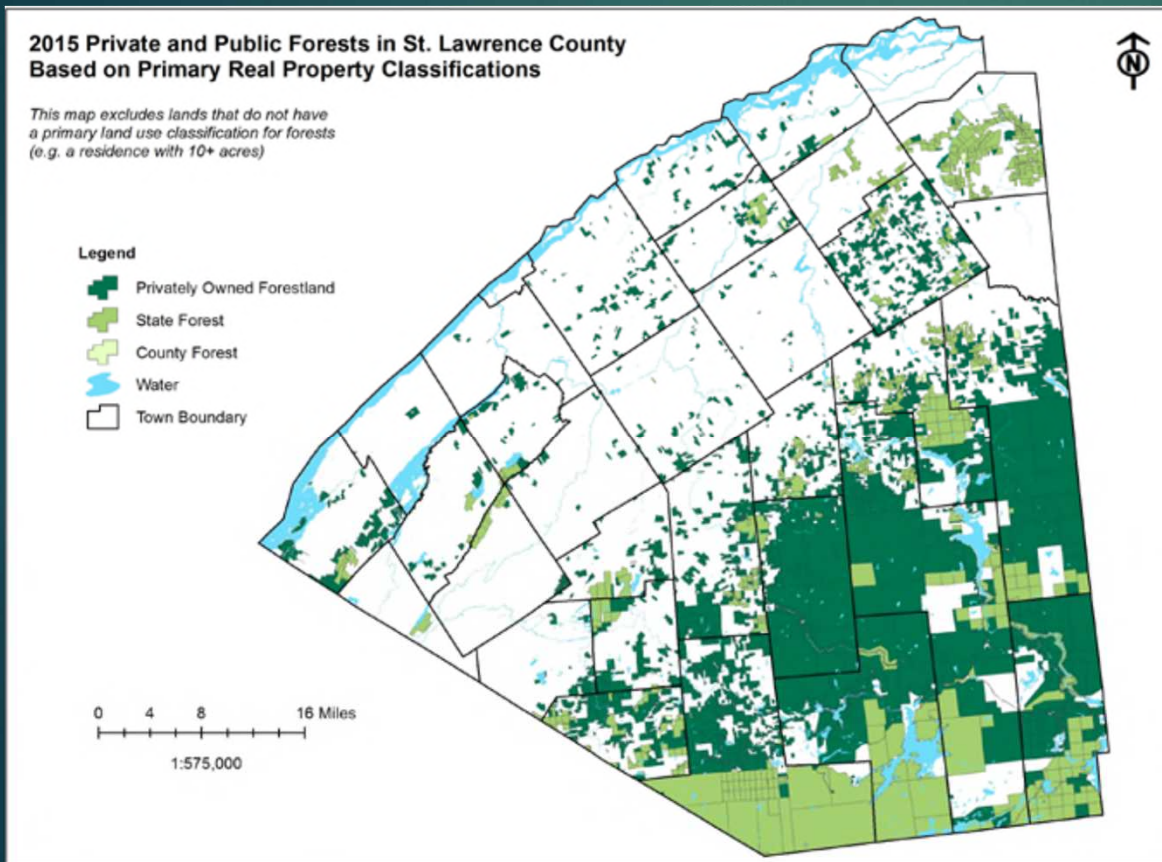
(315) 379-9192 ext. 232

St. Lawrence County, NY

Where we are...



What we are:
7,306 kilomètres carrés
109,000 somewhat square people...



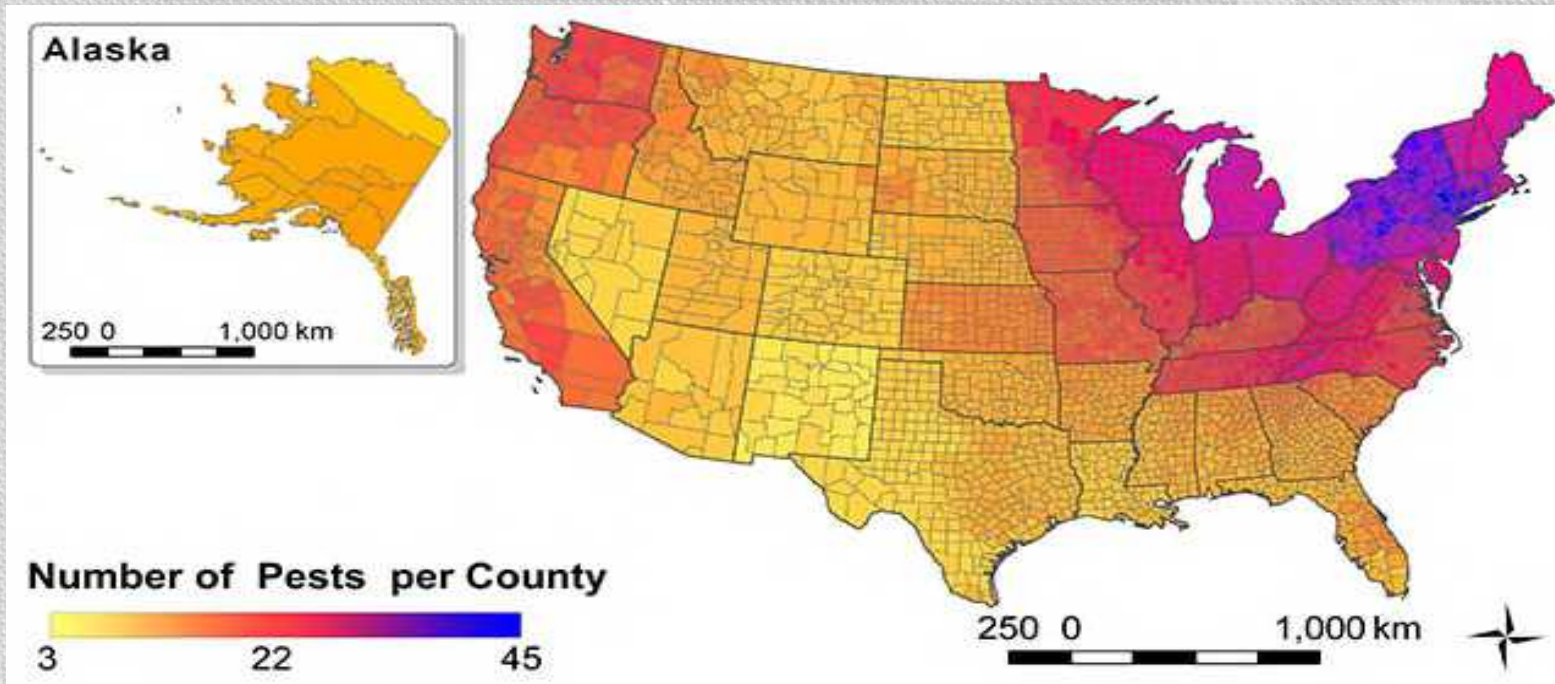
About 40% forested

- 67% Private Land
- 32% NYS
- 1% County

Maple-Beech-Birch
most common forest type

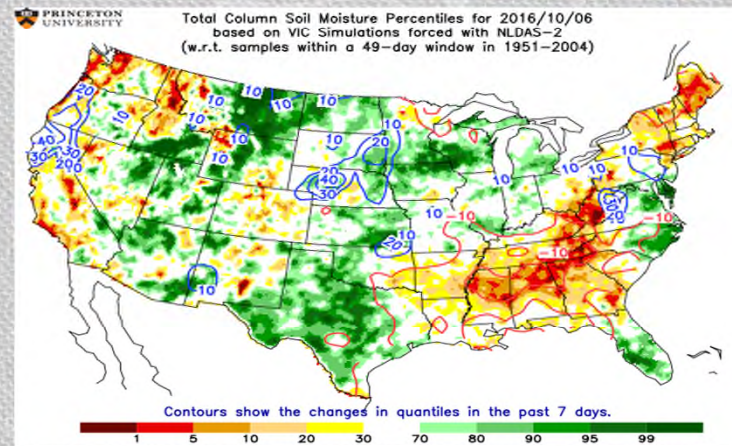
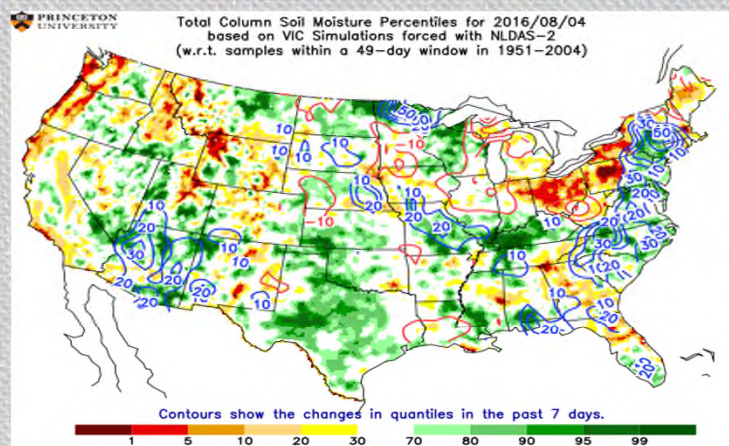
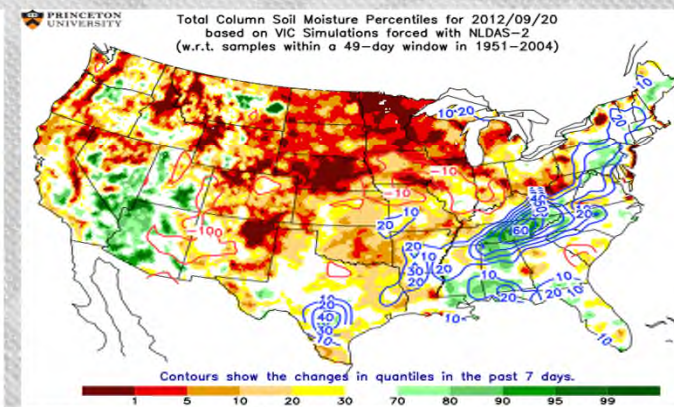
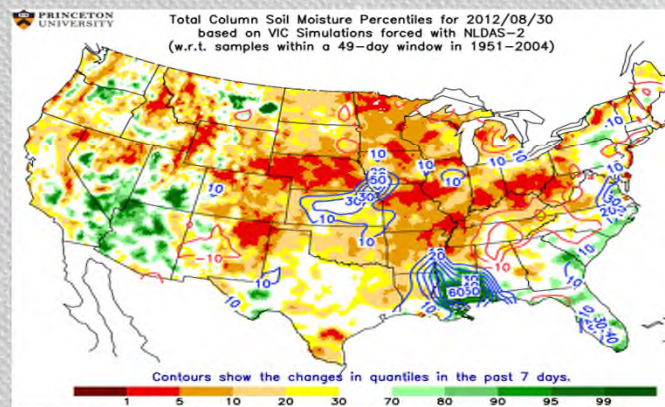
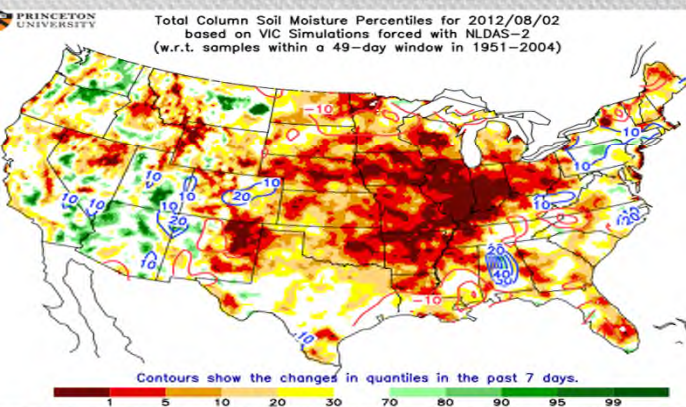
We're # 1! (Sadly)

NYS has more invasive forest pests than any other jurisdiction in North America.
Apologies...



Pests are happier when trees are tenderized:
Drought Years of 2012, 2016, 2018

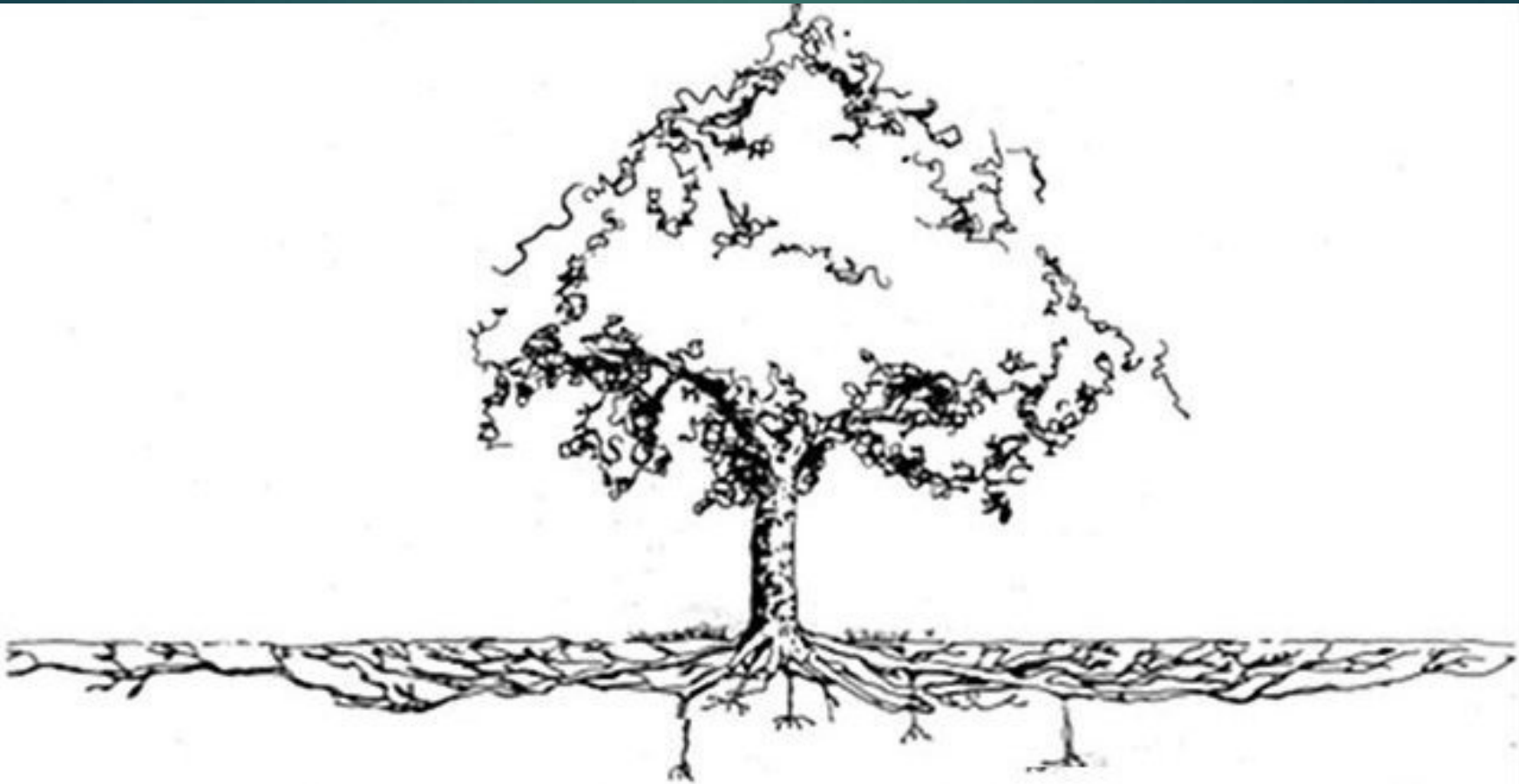




Tree Responses to Drought

- ROOT DEATH
- Release of stored reserves to replace tissues
- Lowered resistance to disease, decay (CODIT reaction)
- Distress crop in extreme cases
- Takes 2-3 “normal” years to return to previous condition
- Lower sugar levels, less wood production
- Altered chemical signature attracts forest pests

**Roots are shallow & fragile:
90% in top 25 cm, and 98% in top 45 cm**



Distress Crops



Maple Bleeding Canker



Hard Times for Hard Maples

Drought stress compounds defoliation damage



2017 & 2018 Forest Tent-Cat & Eastern Tent-Cat Infestations

- Severe but localized

Photo taken 29 July 2017. 225,000 Acres did not refoliate.

In 2018, 20% crop-tree loss
across all age & size classes.



**Most sugar maples did not
produce anthocyanins in
2018.**



**Widespread reports of
poor tap-hole closure in
2017, 2018.**

Eastern Hemlock: A Foundation Species

- Creates unique habitat
 - Shelter for many forest species in summer and winter
 - Freshwater stream conditions
- Base of food web
- Irreplaceable in ecosystem
- Protect freshwater resources from runoff
- Stabilize soils, steep banks, and gorges



Hemlock Woolly Adelgid (HWA)

PUCERON LANIGÈRE DE LA PRUCHE

- Invasive forest pest native to southern Japan
- Feeds on hemlocks' stored nutrients
- Kills trees in 4-10 years in Appalachians, 6-20 years where winters are cooler
- Characterized by white, waxy masses on hemlock twigs at base of needles
- Spreading vectors include birds and other animals, humans, wind, etc.
- Faster spread with warmer temperatures

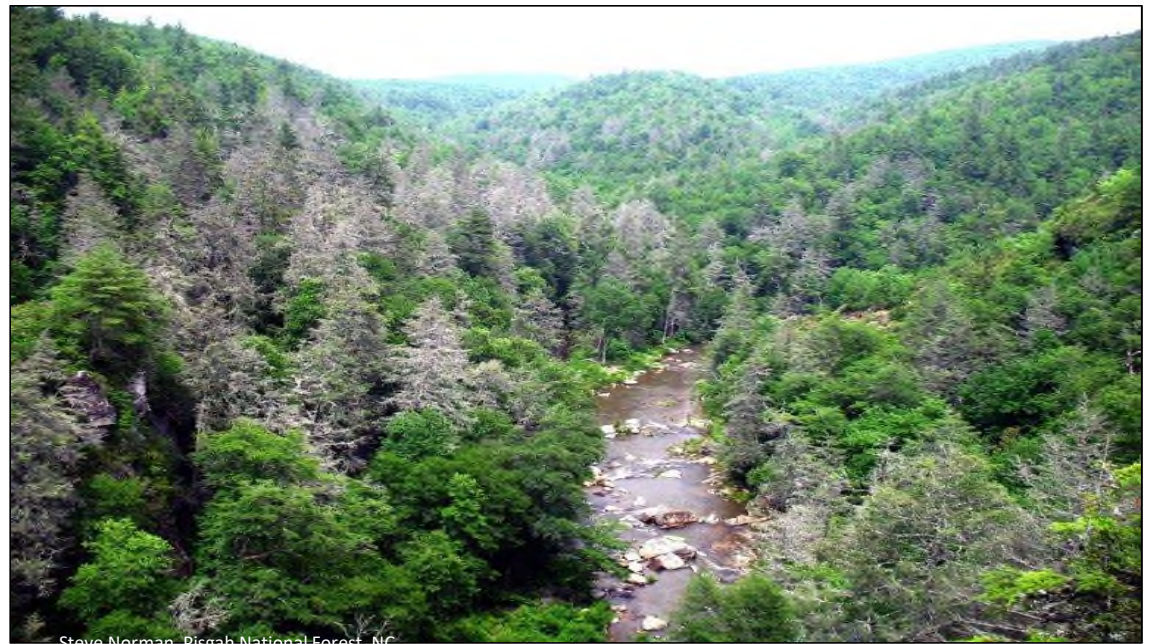


Hemlock Loss Impacts:

- Water quality
- Wildlife and habitat
- Aesthetics
- Economic impacts

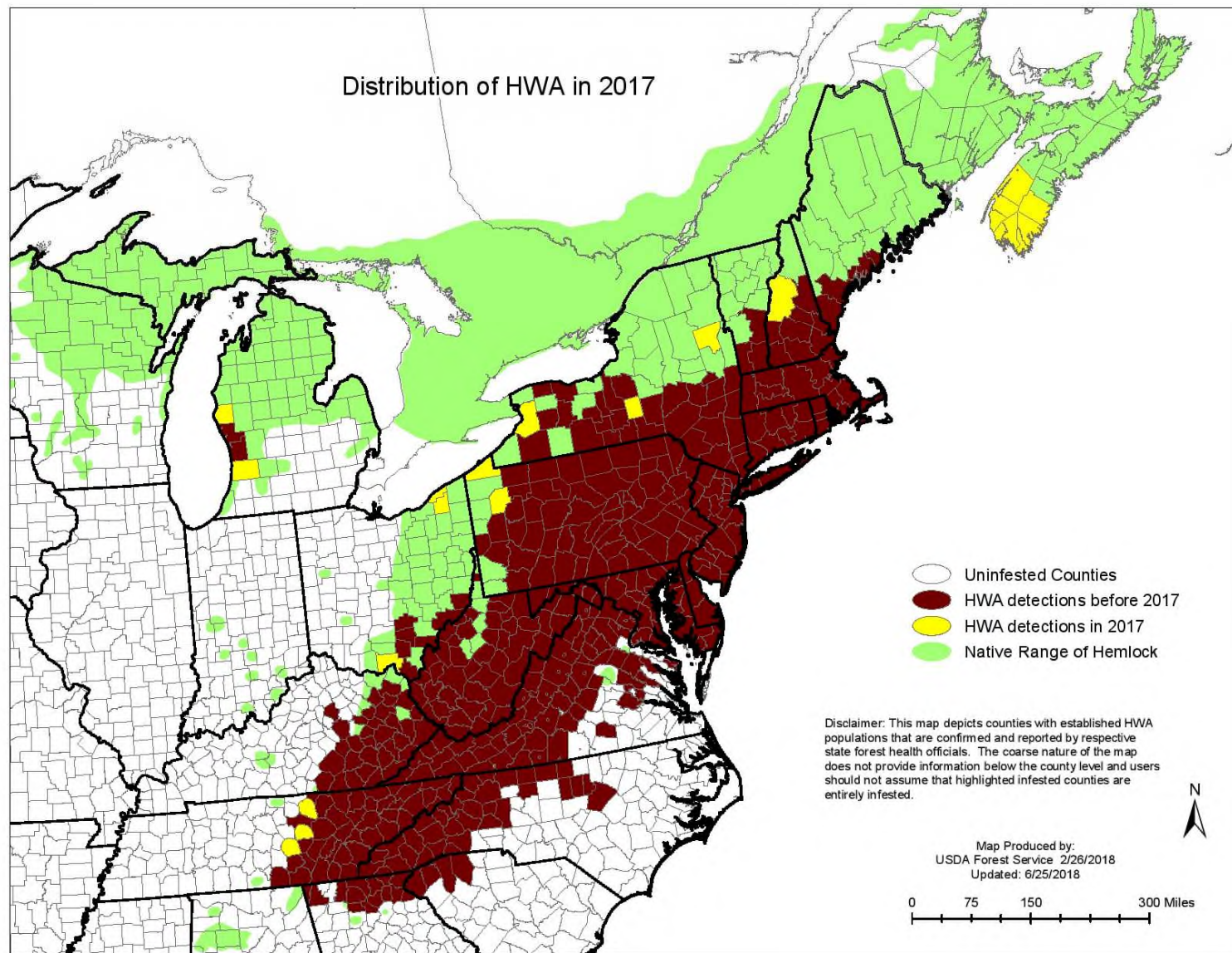
Potentially...

- Allows invasive species to invade new areas



Steve Norman, Pisgah National Forest, NC

12 new
townships
infested in
NYS in 2107



Tips for HWA Hunting!

- Best detection time: **Late fall-early spring**
- **Look for hemlocks** near gorges, streams, and on steep, north-facing slopes
- Look at underside of twigs and branches

Look for...

- Foliage clues:
 - Weakened or declining crown
 - Greyish cast rather than healthy dark green
- HWA infestations on fallen branches
- Wool on bark, washed down from rain event



HWA Boat Surveys

Look for...

- Hemlocks with dull, greyish foliage, pale appearance
- Dead branches

If surveying in late spring-early summer:

- Absence of new, bright green buds



HWA Management

- Important to continue to survey for HWA populations and monitor tree health
- Currently, treating with pesticides is the best option for saving trees in the short term!
- Biocontrols still a long way from widespread effectiveness, but the NYHI is optimistic!
- Releases throughout NY since 2009
- With HWA, damage usually NOT as bad as it looks!
- Treatments very effective, last up to 7 years.



**Spotted Chinese
Lanterns
bring cheer.**



**Spotted Chinese Lanternfly,
le fulgore tacheté,
not so much.**



And, they're too close for comfort!

SLF (*Lycorma delicatula*): The particulars

- Invasive planthopper (Hemiptera) native to China and Vietnam
- Adults approximately 25 mm long by 12 mm wide
- Cold-hardiness is yet unknown
- Over 70 host species identified in North America
- VERY fond of **maples!** Also willow, elm, walnut, birch, grape, apple
- “Juicy tree” hypothesis
- Phloem feeders; gregarious feeding behaviour
- Consummate motor-vehicle enthusiasts, they hitchhike extensively
- **Prefer *Ailanthus altissima*, “Tree-of-Heaven”**
- CFIA has excellent website on SLF

YOU WILL LIKELY SEE THIS PEST IN THE NEAR FUTURE!

In 2016, spotted lanternfly was restricted to 4 Pennsylvania counties.

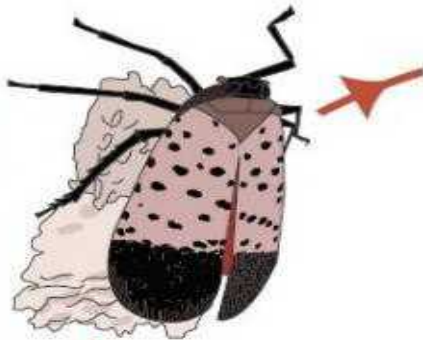
At the close of 2017, no SLF had been found in NYS.

At the end of 2018, scores of SLF specimens had been found in 8 NYS Counties.

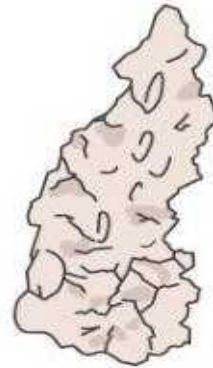
SLF maps need updating almost monthly.

SPOTTED LANTERNFLY LIFE CYCLE

EGG LAYING
September —
December



EGGS
October — June



**HATCH AND
FIRST INSTAR**
May — June



ADULTS
July —
December



**SECOND
INSTAR**
June — July



FOURTH INSTAR
July — September



THIRD INSTAR
June — July



Illustrations by Colleen Witkowski

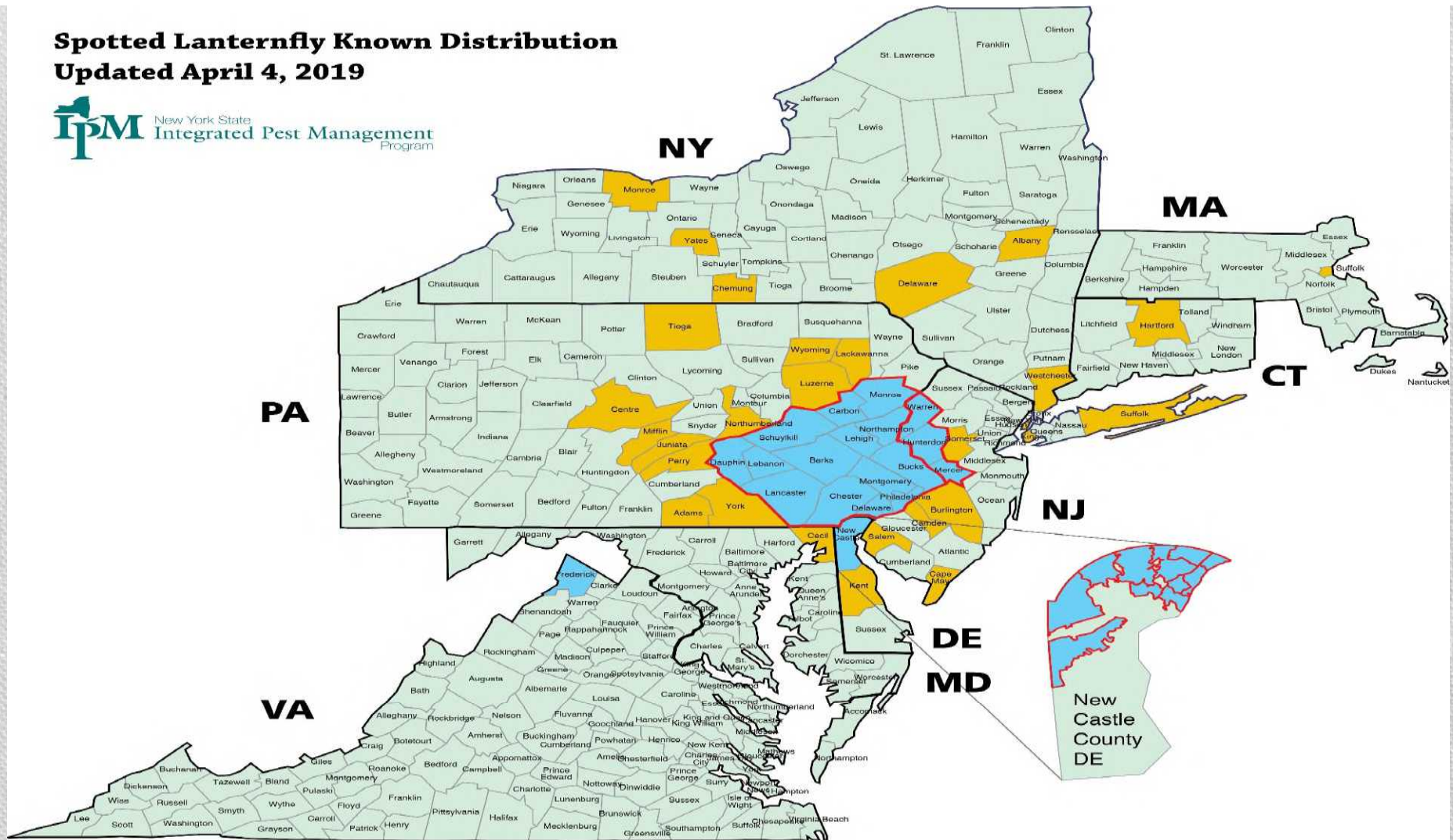
Adult Feeding Pattern: Commuters, Gregarious



Egg masses often well-hidden.
Rusty metal a favourite substrate.



Spotted Lanternfly Known Distribution Updated April 4, 2019



NY external quarantine areas. Spotted lanternfly infestation found.
 Spotted lanternfly found, no infestation.
 Internal state quarantine areas.

THE GAZILLION-DOLLAR QUESTION:

Can SLF reproduce without feeding on *Ailanthus*? Here's a handy flow chart.

IF NO



Whew—dodged that bullet! Just keep *Ailanthus* from establishing here.

IF YES

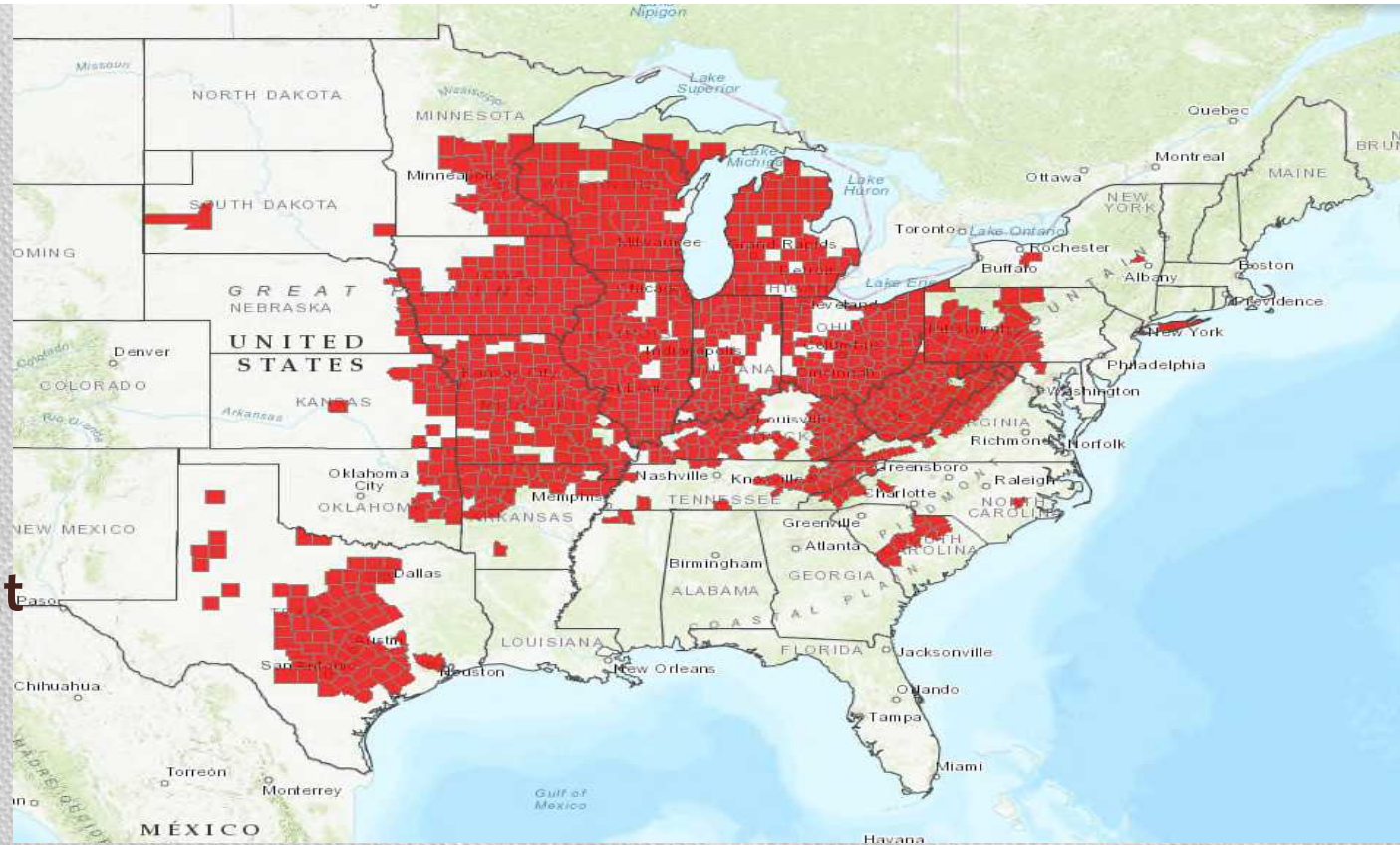


Aw, sh--!

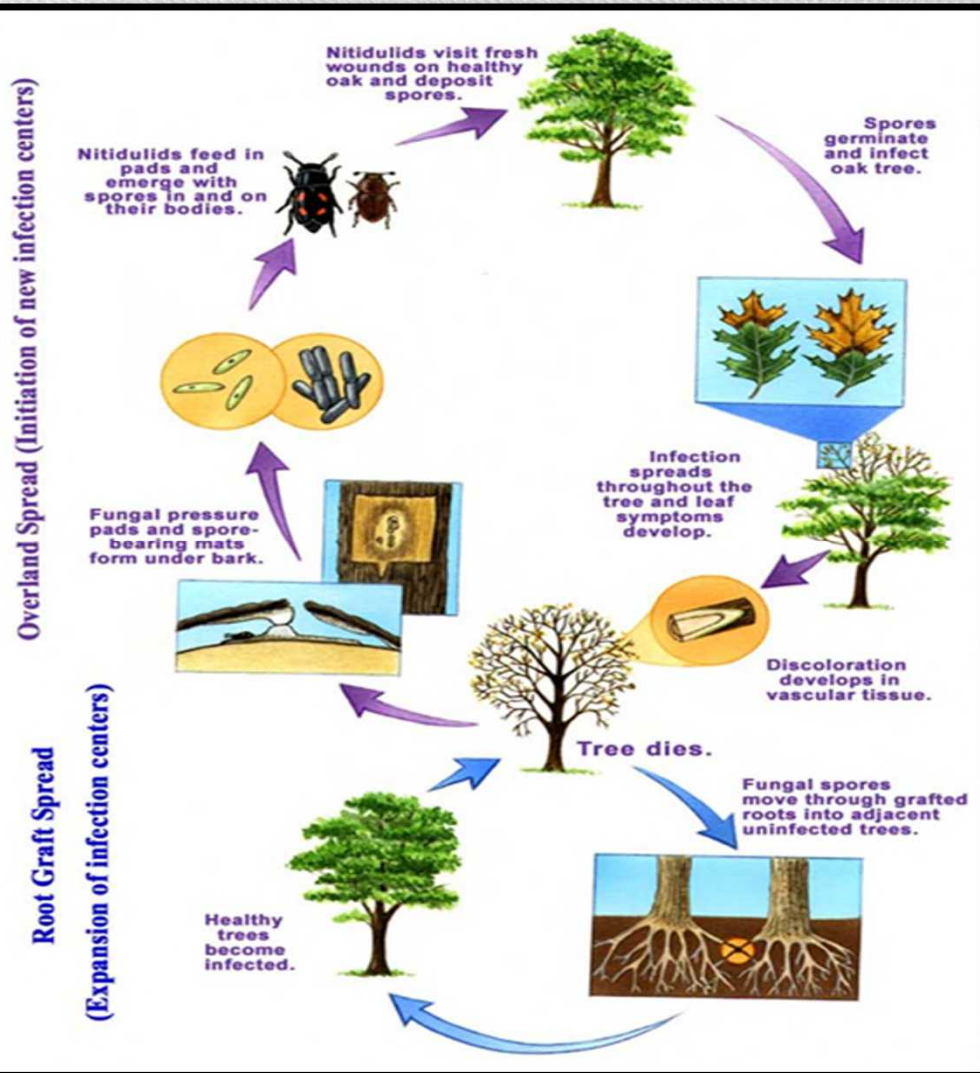
Because lanternfly will head for the nearest maples & fruit trees. We cannot afford to gamble. We need to spread the word, and be vigilant.

Oak Wilt Flétrissement du chêne:

Another emerging threat
to hardwood forests



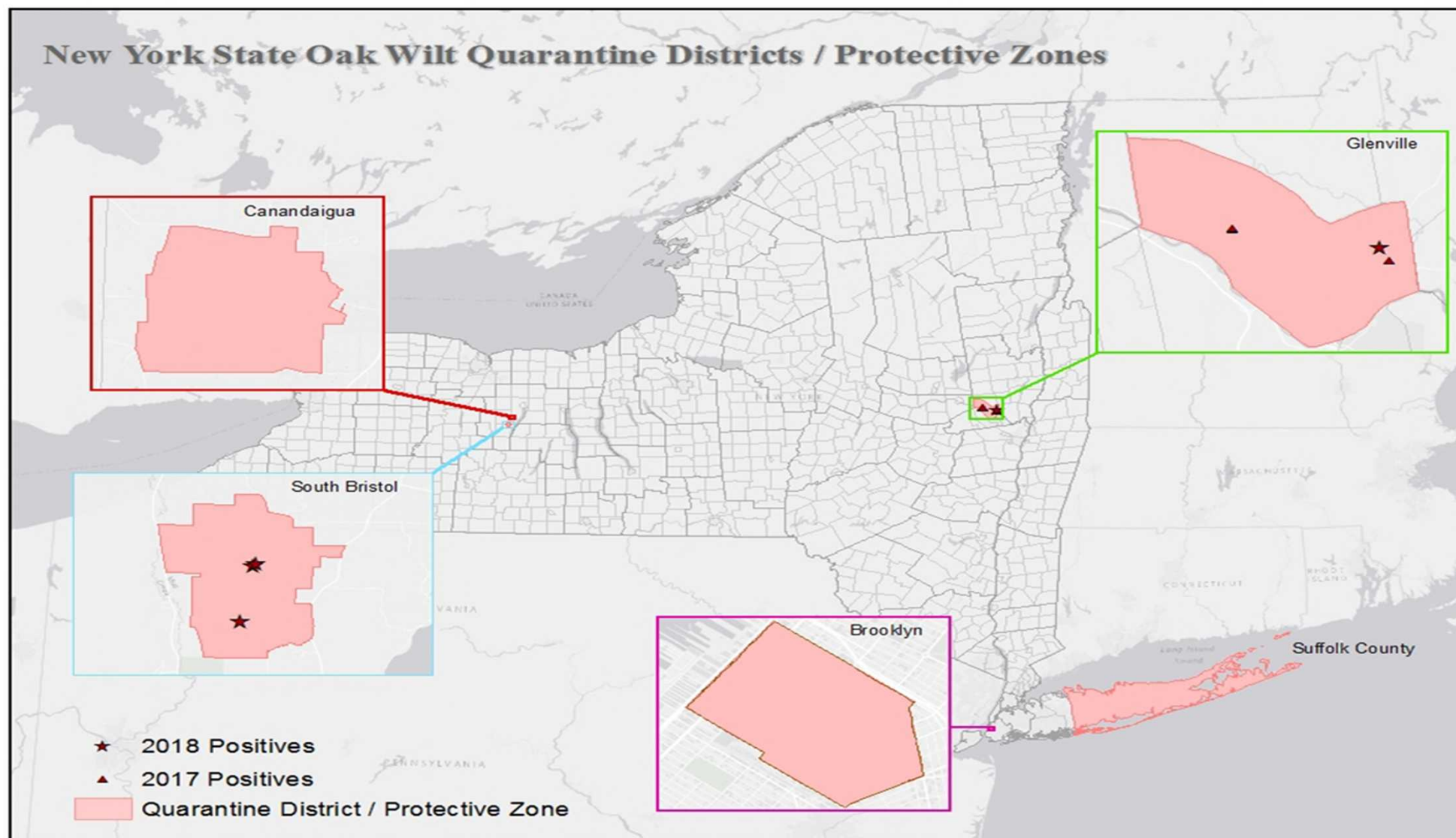
Unknown origin.
First NA detection was 1944 in Wisconsin.



Will kill healthy red oaks from verdant to toast in 2-6 weeks. White oaks may linger for years.



New York State Oak Wilt Quarantine Districts / Protective Zones





Leaves turn brown with no pattern or boundary, unlike anthracnose.



“Why am I raking leaves in July?”



In case of storm or other damage,
IMMEDIATELY spray-paint the wound –
Nitidulid beetles find wounded oaks
within hours.

Also, **DO NOT MOVE FIREWOOD!**



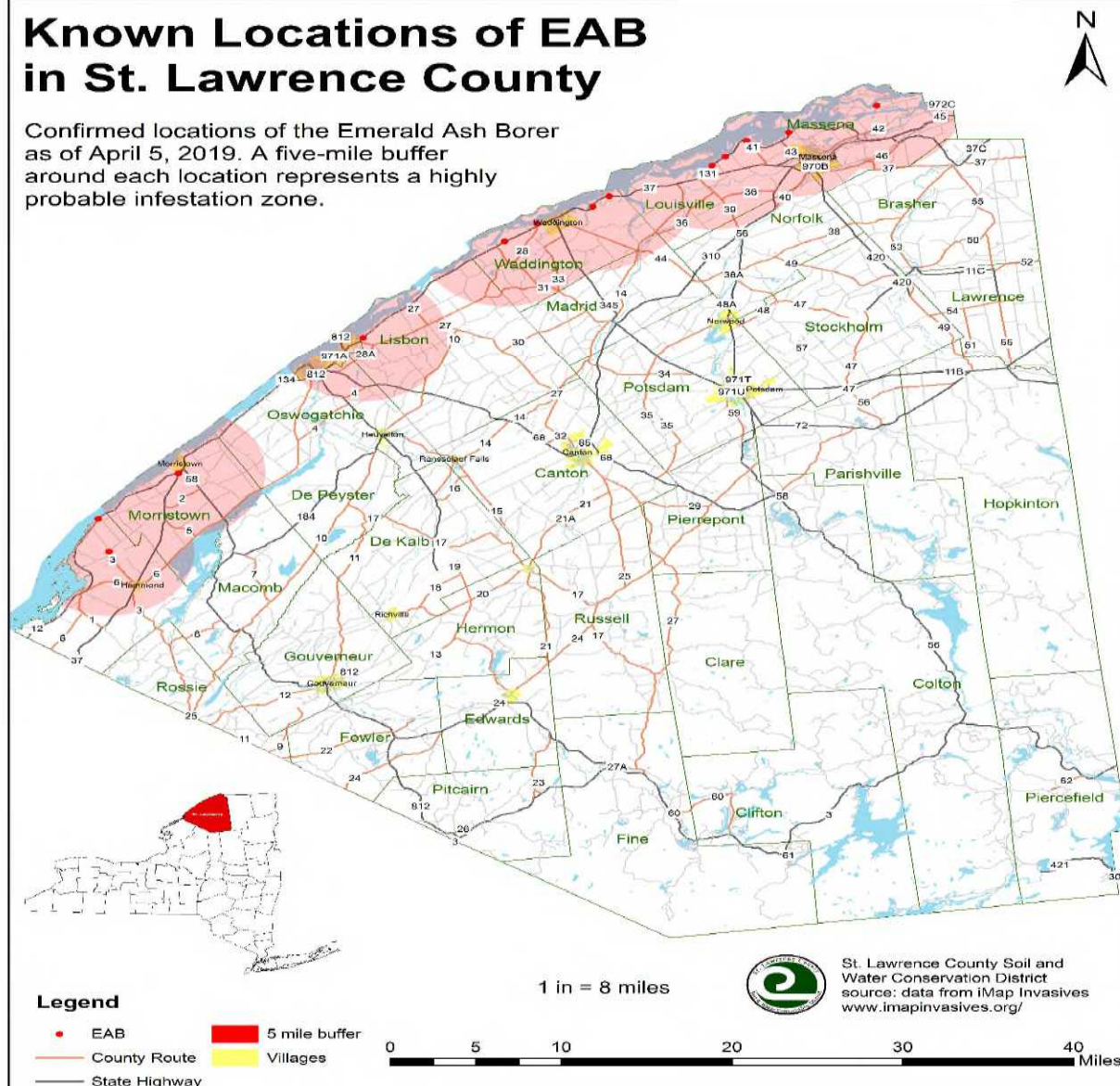
BORING



EAB (Agrile du frêne), or *Agrilus planipennis* to its friends

Known Locations of EAB in St. Lawrence County

Confirmed locations of the Emerald Ash Borer as of April 5, 2019. A five-mile buffer around each location represents a highly probable infestation zone.



EAB Biological Control Program

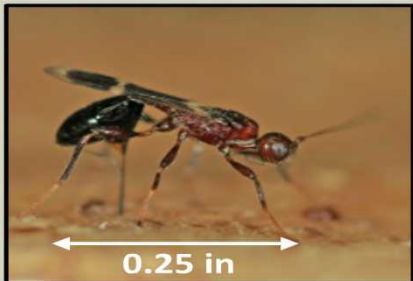
Four parasitoid wasps introduced to North America

T. planipennisi doing very well in NYS

Biocontrols compatible with chemical treatment



Larval Parasitoids



Spathius agrili



Spathius galinae



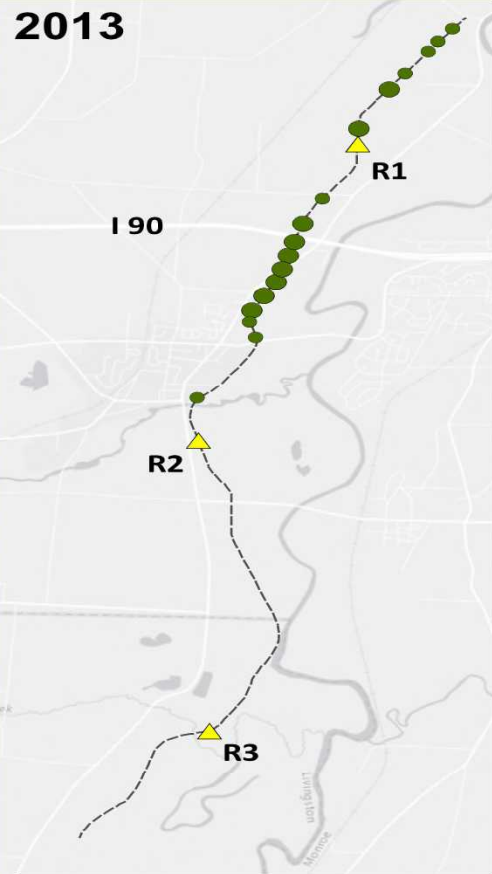
Tetrastichus planipennisi

Egg Parasitoid

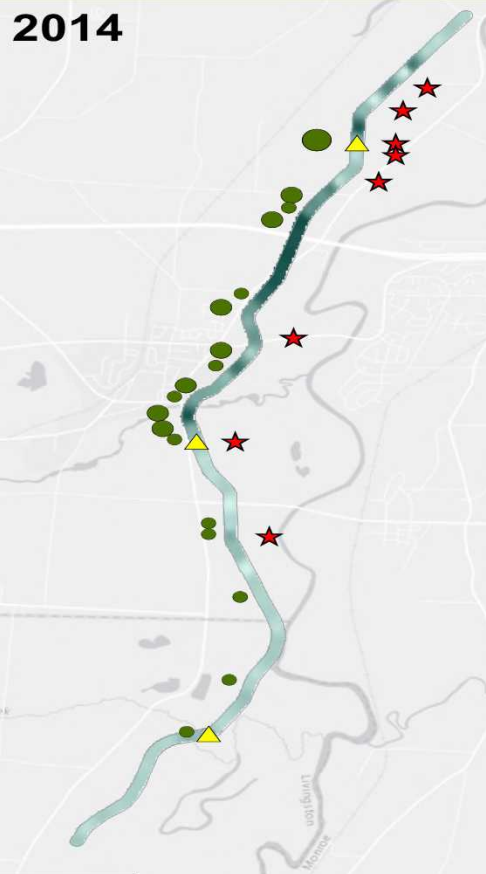


Oobius agrili

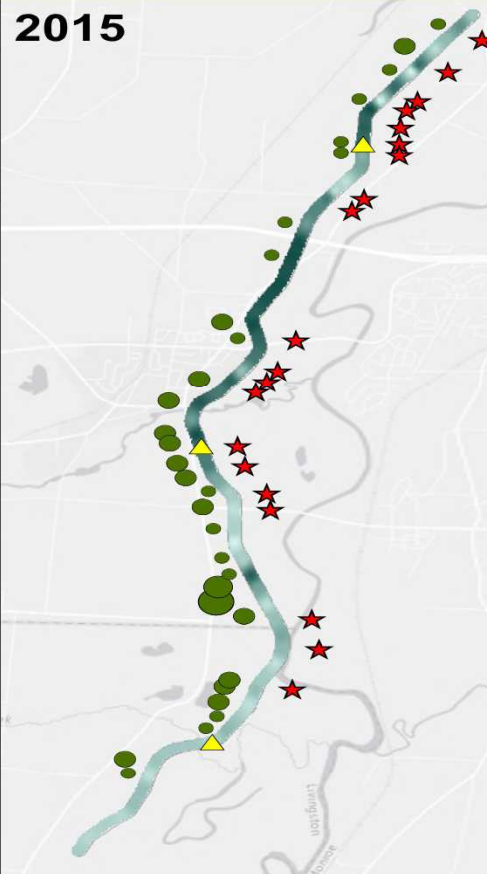
2013



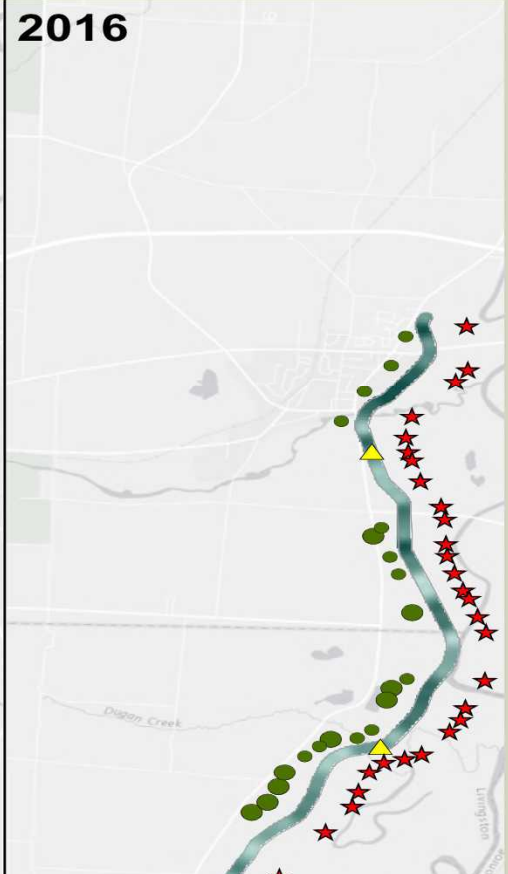
2014



2015



2016



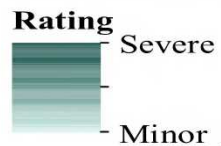
EAB Caught

- 1
- 2 - 10
- 11 - 20
- 21 - 35

★ *T. planipennisi*

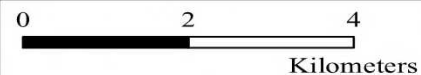
▲ Parasitoid Release

EAB Infestation Rating

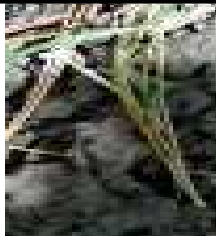


N

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and the GIS user community



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and the GIS user community



GOT WORMS?

European earthworms already cause damage

Loss of duff layer a major impact on sugar maple.

Compacted, subsided forest soil, degraded root systems, fewer seedlings where earthworms present.



Healthy, undisturbed forests are dynamic ecosystems based on complex soil communities.


The key to forest health is robust mycorrhizae (and fewer deer).





**What about those
OTHER worms...**

Asian jumping worms in genera *Amyntas* & *Metaphire*:
2013-WI; 2016-Québec; 2018-St. Lawrence Co. These have been
little recognized or studied and are not well understood.

- 
- Overall dark, almost gray
 - Glossy smooth skin
 - Clitellum **light; flush** to body
 - Very **animated**: thrash, jump
 - Large adults: 20 cm / 8"
 - **Snake-like, remain on surface**
 - Shed tail when handled

What do jumping worms do?

- Mature in 60 days, 2X FASTER than *Lumbricidae* = 2 hatches/ yr.
- Voracious appetites; REMOVE DUFF LAYER TO MINERAL SOIL.
- Cocoons winter over, and are HARDY to -40 C OR COLDER.
- ADAPTIVE to varied habitats and temperature regimes.
- TOXIC to many amphibians, invertebrates, and mycorrhizae.
- Produce unique soil signature = MORE EROSION & COMPACTION!
- ROB the SOIL SEED BANK, inhibiting normal regeneration.
- Eliminate ground-nesting birds.
- ELIMINATE NATIVE GROUND COVER, encouraging invasive plants.
- Parthenogenic = asexual reproduction: Just 1 can start a family.



**Cocoons are easily
transported**



Check your property for Asian worms using a dilute mustard solution. Mix 4 L of water with 40 grams ground yellow mustard seed, & pour slowly into the soil. This will drive any worms to the surface. If you have jumping worms, report it, and avoid moving plants or soil from your yard.

Reasonable Precautions

- Educate yourself and others to recognize Asian worms & their signs.
- Arrive clean, leave clean: If possible, power-wash trucks & equipment between sites.
- Check site: turn over stones, logs. Asian worms active June-October
- Seedlings for reforestation should be bare-root. Check shipping media carefully.
- Check nursery plants before you purchase.
- Know the origin of topsoil, mulch, compost you buy.

REPORTING:

Jean-David Moore, M. Sc., Chercheur scientifique
Direction de la recherche forestière
Ministère des Forêts, de la Faune et des Parcs
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Other Forest-Health News from Down South:

- ▶ Conifer needlecast has become an apparent primary cause of death in all species. White pine is very hard-hit.
- ▶ Balsam woolly adelgid is causing increased mortality.
- ▶ Tree mortality from 2017 floods becoming evident.

Also an invader: Blacklegged or Deer Tick
Ixodes scapularis



Adult vs. Nymph vs. “Larva” (1st instar nymph)



Tick-Borne Illnesses

- ▶ Lyme disease: **Transmitted by** blacklegged, a.k.a. deer ticks (*Ixodes scapularis*); **Caused by** *Borrelia burgdorferi*, *Borrelia mayonii*, and *Borrelia miyamotoi*.
- ▶ Anaplasmosis: Transmitted by blacklegged ticks.
- ▶ Babesiosis: Microscopic parasite, *Babesia microti*, infects red blood cells. Transmitted by blacklegged ticks. Common in NNY. (NYSDOH, 2014)
- ▶ Ehrlichiosis: Transmitted by lone star ticks (*Amblyomma americanum*).
- ▶ Powassan disease: Transmitted by blacklegged and groundhog tick (*I. cookei*).
- ▶ Tularemia Transmitted by dog ticks (*Dermacentor variabilis*), wood ticks (*Dermacentor andersoni*), and lone star ticks.
- ▶ Alpha-Gal Allergy: Transmitted by lone star ticks.

**Asian Longhorned (Cattle) Tick: 1st NJ in 2017, then NYS in 2018.
Now in 7 US States. Moving faster than expected. Vector potential
in NA unknown, but is a major disease vector in its home range.**



Impact of Deer



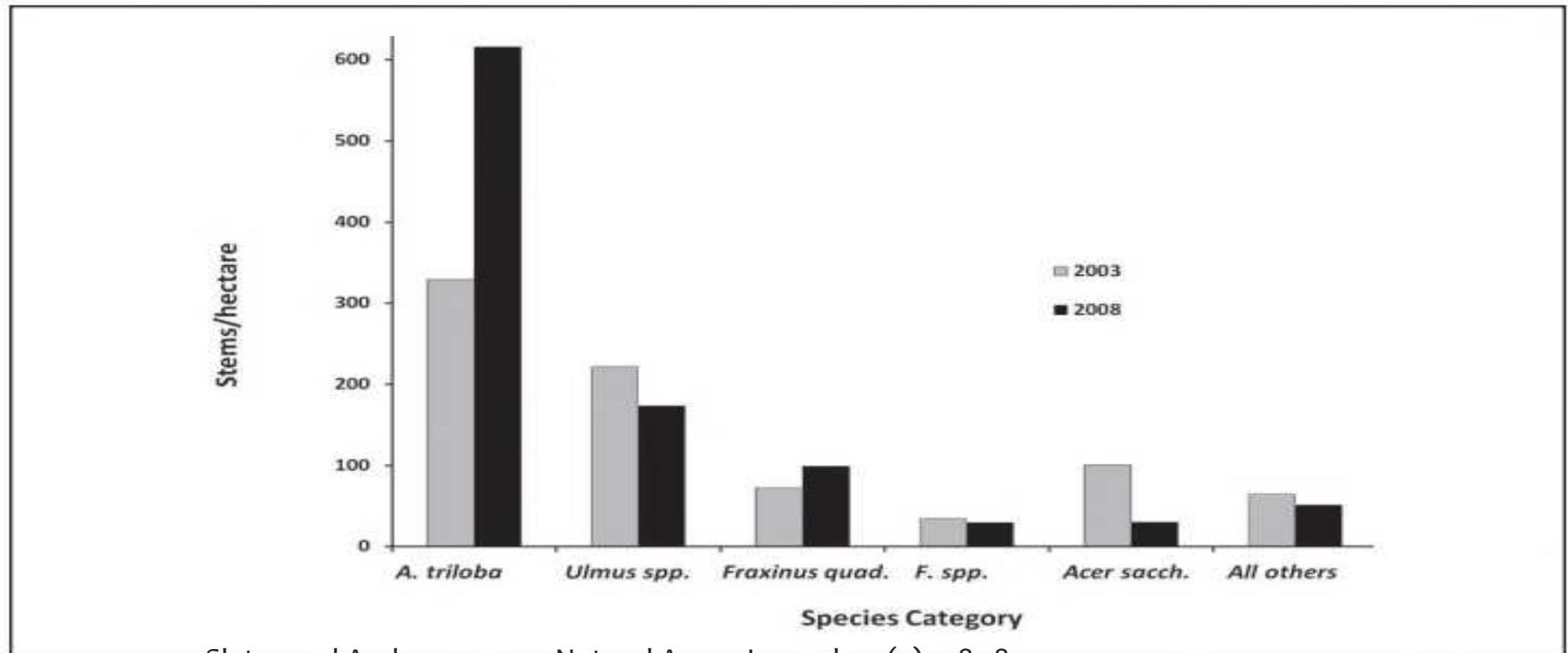
Eat 6 to 8 lbs. fresh weight per day. @ 600 tree seedlings/ lb. = 4200 seedlings/ deer/ day (if exclusively forest-fed), or 882,000 seedlings/ deer/ year

Encourage invasive plants through feeding preferences

Associated with spread of invasive earthworms

Lyme would disappear if density fell below 4/ sq. km!

Deer Browse Selectively



Slater and Anderson. 2014 Natural Areas Journal, 34(2):178-187. 2014.

Figure 2. Seedlings per hectare of tree species containing ≥ 4 stems in 2003 or 2008. Blue ash (*Fraxinus quadrangulata* Michx.), a low-use browse species, is the only taxon other than *A. triloba* that decreased in density between the two sampling periods.

Un mélange des agences privées et publiques opérant à NY

Cornell University Cooperative Extension:

- Part of Federal Land-Grant System; All 62 NYS Counties have Extension office, all different
- Cornell University provides faculty support, plus Extension Specialists, e.g. maple, hemlock
- \$ from County (22%), State (24%), Federal (1%), Grants (19%); the rest from program fees
- Educators & Specialists have a high degree of autonomy & flexibility
- Cross-border travel generally OK, mileage can be an issue for County-based folks

New York State Department of Environmental Conservation:

- 9 Regions plus Central Office
- Regulatory, Enforcement, Outreach
- Division of Lands & Forest, Bureau of Invasive Species & Ecosystem Health
- Bureaucratic – workers have little autonomy; restrictive, rare to cross border (or Region)
- NYSDEC operates with about half the people of 25 years ago, staff stretched thin

St. Lawrence County Soil & Water Conservation District

- Variety of funding sources, mostly federal, often grant-driven, some County
- Has Forester position; currently very active in EAB monitoring, SLAM
- Current admin is progressive; Forester has great discretion

St. Lawrence County EAB Task Force

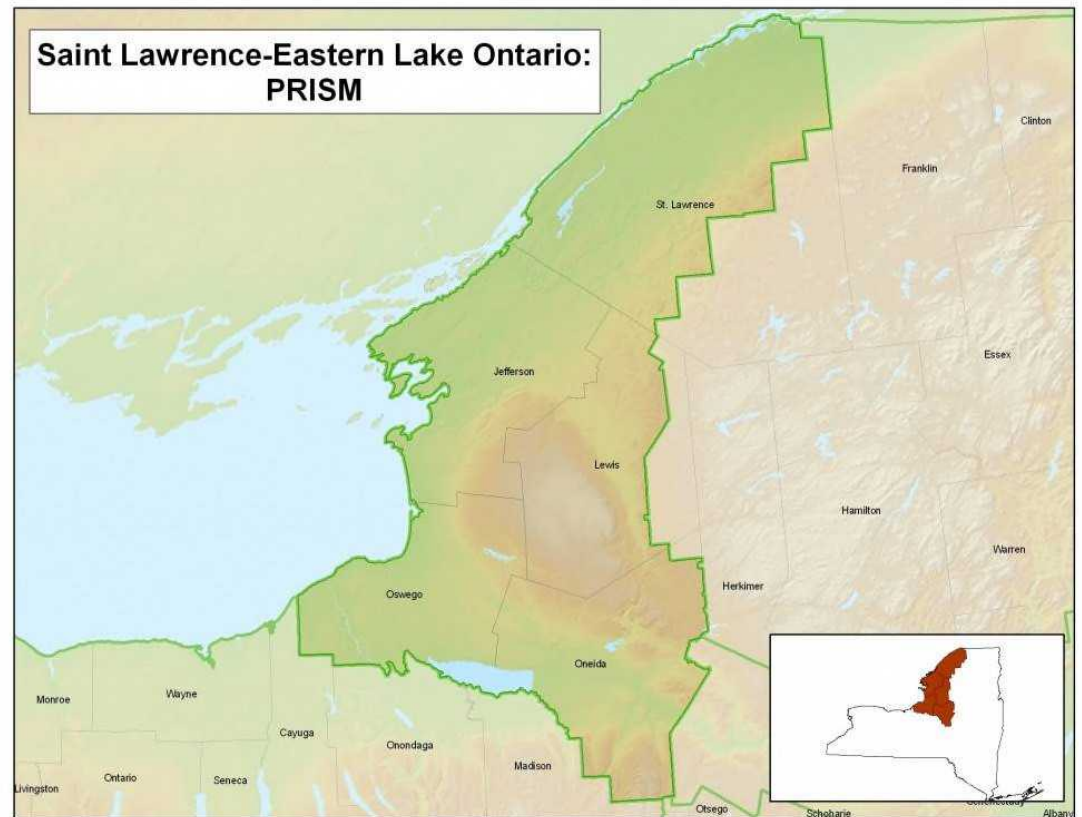
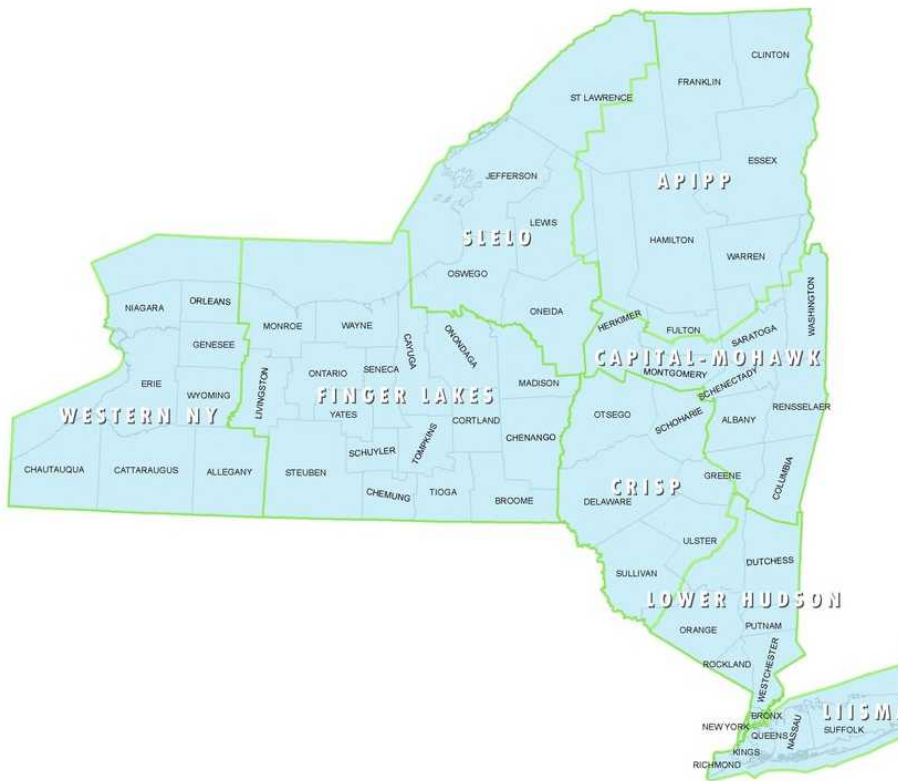
- All volunteers, many agencies (power, highway, County Planner, arborists); Since 2015
- Dynamic, hard-working group, but no budget
- Have used Ontario EAB readiness materials (Thanks!)
- Happy to come North, but probably have little to add to the EAB discussion...

NYS University College of Environmental Science and Forestry (SUNY ESF)

SUNY ESF Wanakena Ranger School

- Sources of presenters, typically eager to respond
- You may be among the first to hear about new research

NYS Partnership for Regional Invasive Species Management (PRISM) System



8 PRISM Regions * NYS Funded * Privately Administered

Tasked with

- Invasive Species Prevention
- Invasive Species Monitoring
- Invasive Species Early Detection & Rapid Response
- Fostering Cooperation Among Partners
- Invasive Species Suppression/Containment/Eradication in critical habitat as feasible
- Ecological Restoration when possible
- Education & Outreach

Citizen Science: Nature Up North

- Affiliated with St. Lawrence University in Canton = access to LOTS of resources
- Small staff, many summer interns = enthusiastic, hard workers
- Education/ Outreach, Citizen involvement through phone Apps.
- Hosts iMap Invasive trainings
- Can tailor-make reporting platforms as needed/ requested
- Has access to ARC GIS systems, can integrate data into county and region databases
- Flexible, responsive, creative, easy to work with

USDA Animal & Plant Health Inspection Service (APHIS)

- Have not worked directly with them
- Took them 12 months to confirm EAB found at Akwesasne...

Down Sides (the usual)

- Territorialism
- Lack of communication/
Miscommunication
- Personalities/ Ego
- Funding & Services cuts
- Funding restrictions
- Bureaucracy

Positives

- Most often a high degree of cooperation & synergy
- Private agencies (e.g. power company) often generous in cases of shortfall
- Can use varied strengths (individual and agency) and access to resources to advantage
- Increased outreach through partner websites and social media

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