

Assessing the Impact of Emerald Ash Borer Biological Control on the Health of Ash Trees in Two Outlier Infestations in New York State

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Completion date: December 2017

- Establishment of emerald ash borer parasitoids
- Assessment of EAB parasitism
- Ash health assessments

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Project Summary

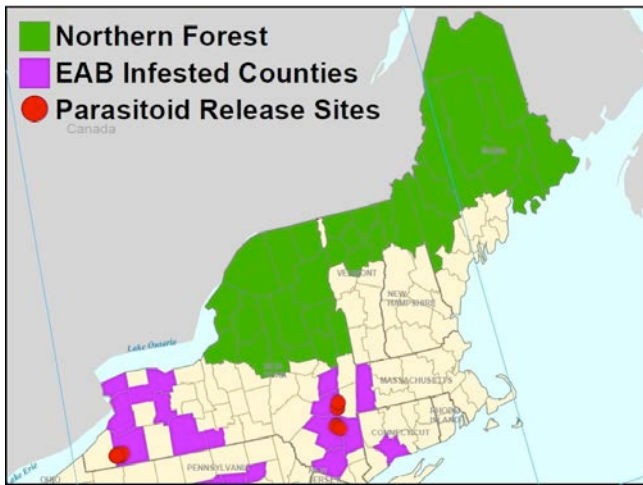
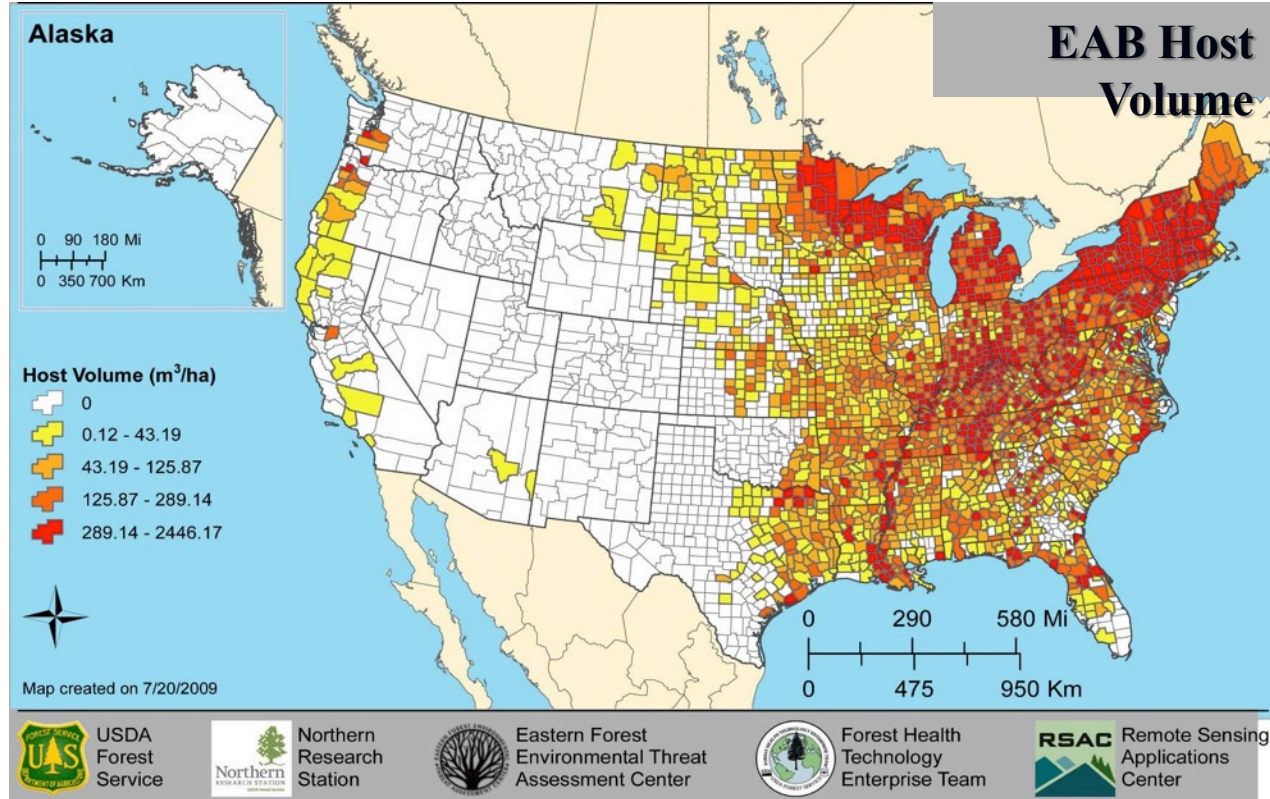
- **Overall objectives:** Throughout this research, we sought to meet two primary objectives: 1) quantify EAB populations and parasitoid densities at release and control plots to determine if establishment of EAB parasitoids has significant effects on EAB populations, and 2) evaluate short and long-term impacts of EAB biological control on ash health in stands with a substantial component of white ash.
- Since 2013, we have worked with cooperators from multiple state (NY DEC and Ag & Markets) and federal (USDA APHIS and ARS) agencies to meet these objectives. Yellow pan traps (YTPs) were deployed and monitored in our study sites to gauge establishment of released parasitoids while within-tree densities of EAB and parasitism rates were quantified through felling and peeling bark of ash trees.
- Through annual monitoring of ash health, we have documented the state of both large and small trees in relation to biological control releases. We also evaluated parasitism in saplings and found much higher parasitism rates relative to larger ash trees. Seedling and sapling inventories indicate there will be another cohort of ash and with establishment of parasitoids, there is hope that they will exert control of EAB populations. A follow up study in 2020 and every 5 years thereafter would be excellent to carry out to continue monitoring efficacy of biological control.

Emerald Ash Borer

Ash as a Host Resource



**Order Coleoptera:
Family Buprestidae**



- Northern Forests w/ more ash than the rest of the country
- New York EAB infestations near forest boundaries
- What we learn in those forests can provide information for management

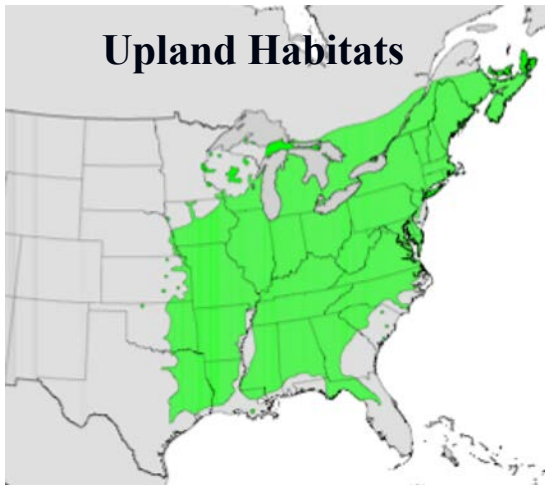
- **A threat to all North American ash trees, *Fraxinus* spp.**

- **NY Ash**



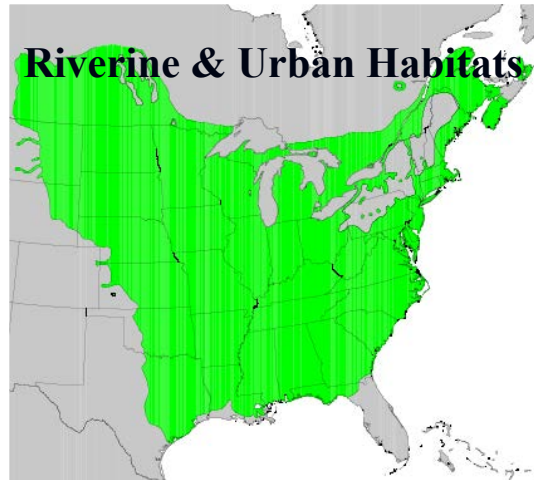
White ash

Fraxinus americana



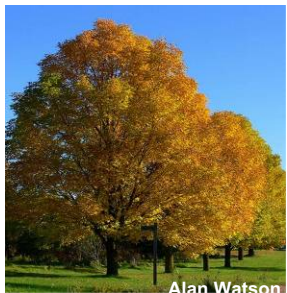
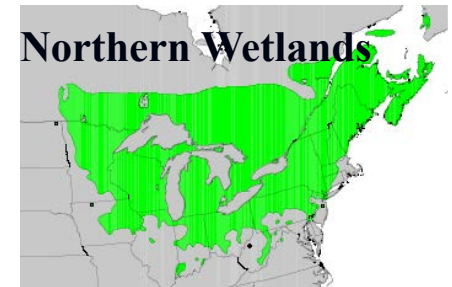
Green Ash

Fraxinus pennsylvanica



Black ash

Fraxinus nigra



- **Impacts**

- **Ecological**

- **Economic**

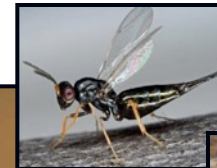
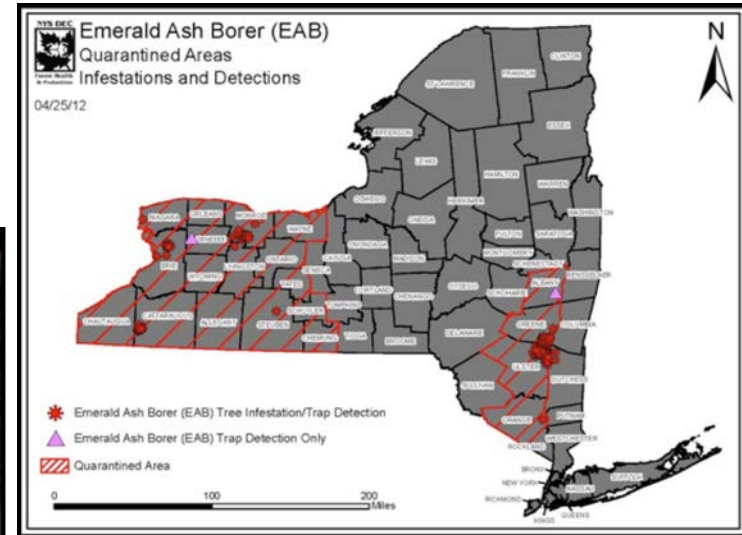


- **Social**



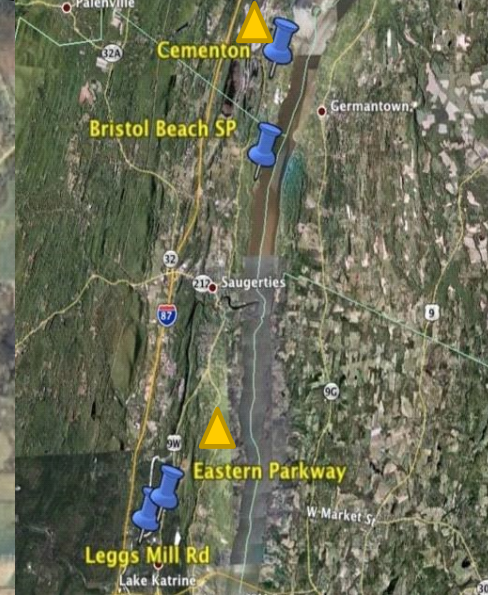
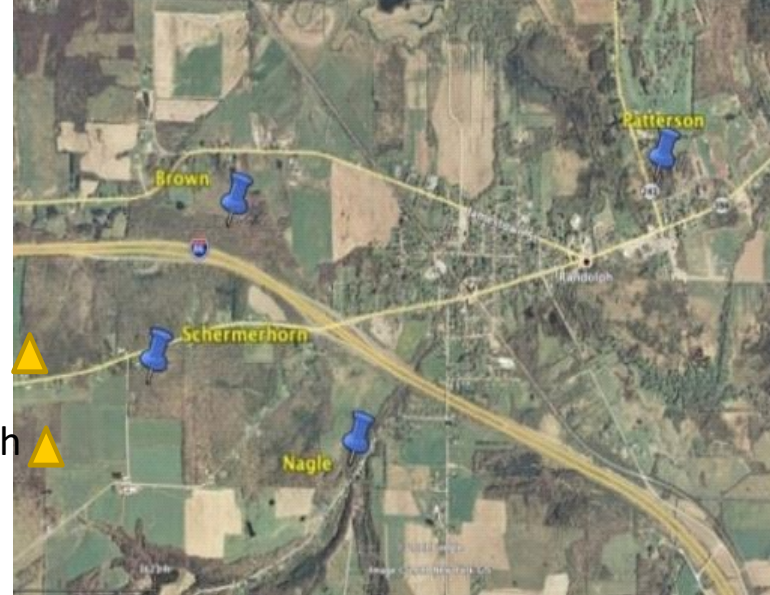
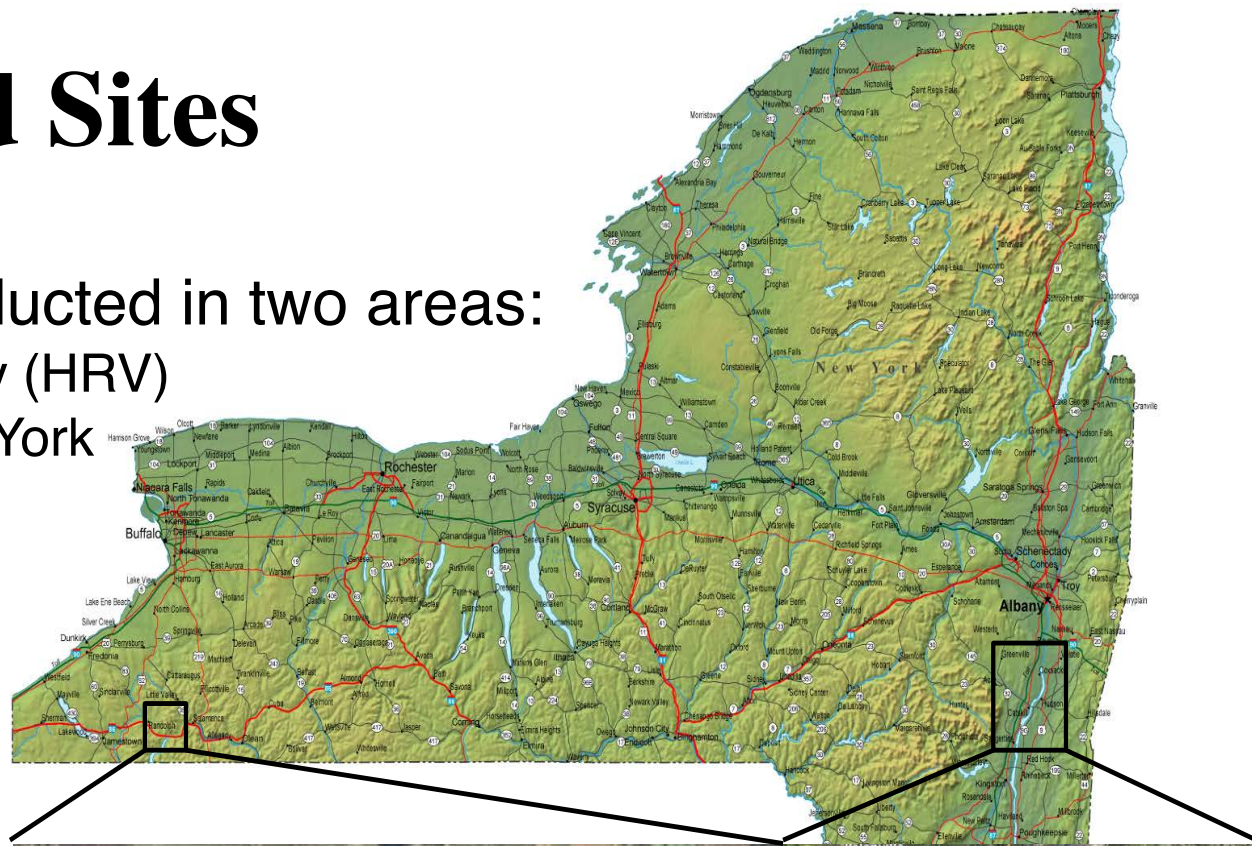
- EAB Management

- Detection
- Delimitation
- Education
 - DEC
 - Firewood
- Legal
 - Quarantines
- Slow Ash Mortality
 - Mechanical
 - Insecticides
 - TreeAge
 - Biocontrol
 - Pathogens
 - Parasitoids
 - Most likely to succeed



Field Sites

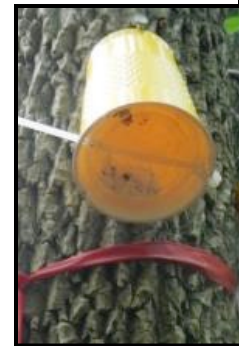
- Research was conducted in two areas:
 - Hudson River Valley (HRV)
 - Southwestern New York near Randolph



Control (triangles) and Release (push pin) sites in Randolph (left) and the Hudson River Valley (right)

EAB Parasitoid Releases

- Parasitoids were released in 2011, 2012, and 2013
- Larval parasitoids were released from bolts
- Egg parasitoids via oobinators

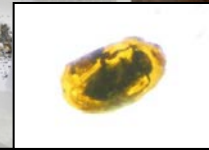


| | <i>Oobius</i> | <i>Tetrastichus</i> | <i>Spathius</i> | | <i>Oobius</i> | <i>Tetrastichus</i> | <i>Spathius</i> |
|-----------------|---------------|---------------------|-----------------|-----------------|---------------|---------------------|-----------------|
| Ulster | | | | Randolph | | | |
| Bristol Beach | 1200 | 1650 | 3820 | Battle Creek | 1200 | 1700 | 2742 |
| Cementon | 1200 | 1650 | 3820 | Conewango | 1100 | 1800 | 3942 |
| Eastern Parkway | 1200 | 1650 | 2122 | Ormond | 1200 | 1700 | 2742 |
| Leggs Mills | 1200 | 1650 | 2122 | Watts Rd | 1200 | 1700 | 3942 |

Parasitoid Establishment & Parasitism Rates

- **Bark Peeling**

- Four trees/plot were felled from release and control plots
- Outer bark was scraped to look for parasitized eggs
- Outer bark was peeled to assess EAB densities and larval parasitism



- **Monitoring: Yellow Pan Traps**

- Pan traps were deployed and monitored weekly May through September

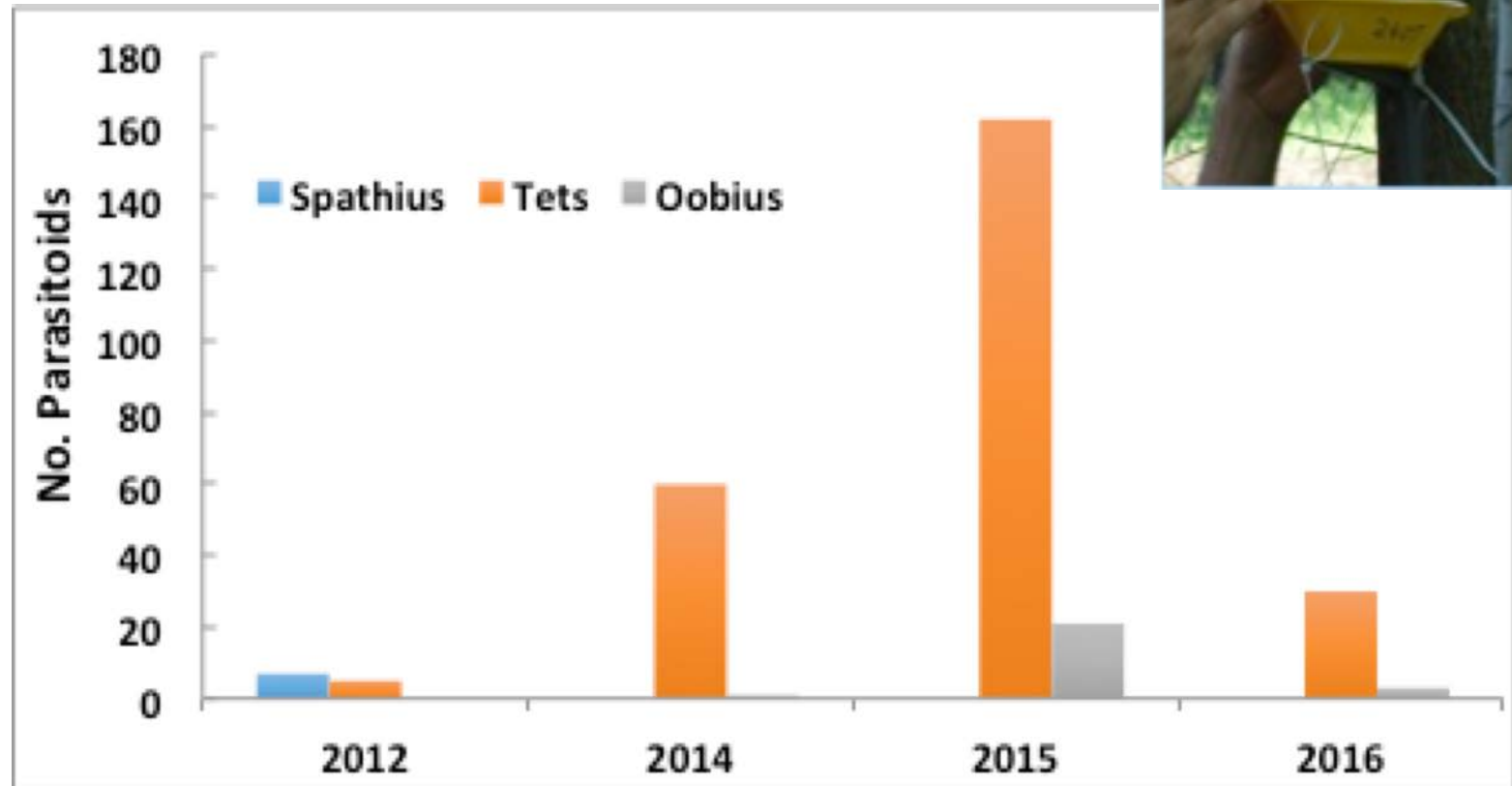
Results: Ash Health

- Number of dead and dying trees has increased over time...
panels =
Randolph sites
2014 to 2016



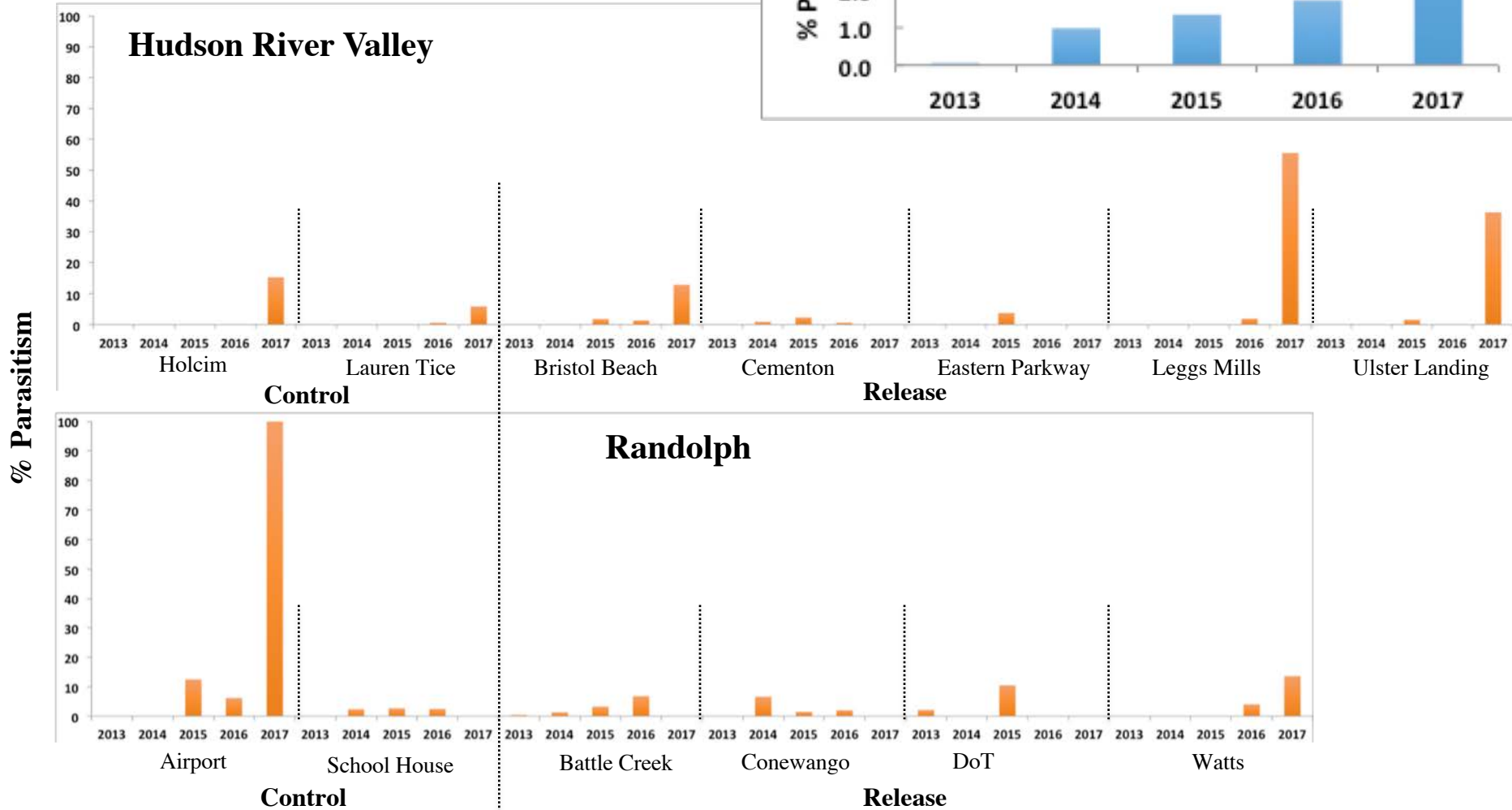
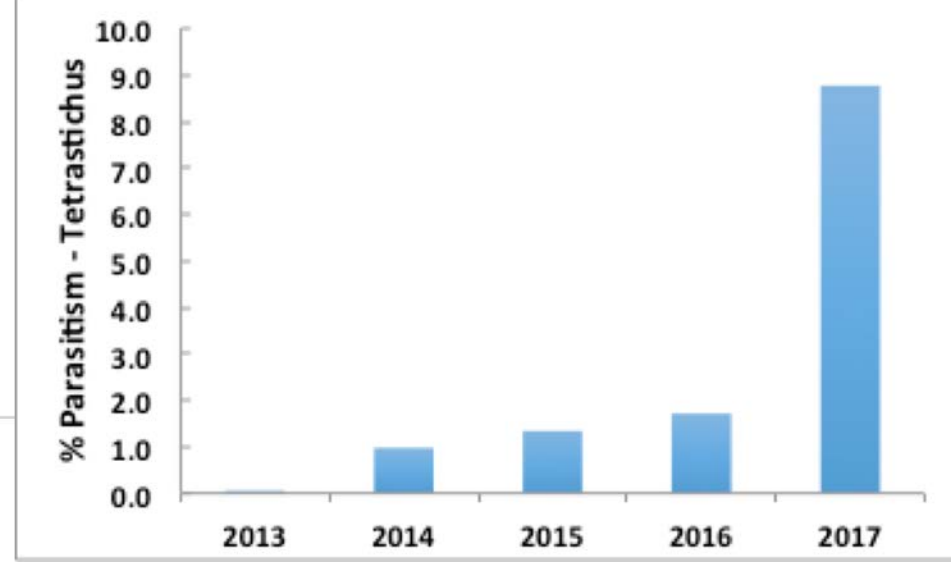
Parasitoid Establishment

- *Tetrastichus* and *Oobius* established in field plots and spread to control plots
- *Spathius agrili* did not establish



Parasitism

- Increasing over time



EAB now in the Northern Forests



United States
Department of
Agriculture

Cooperative Emerald Ash Borer Project

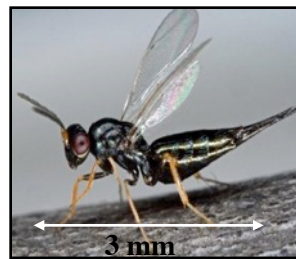
Initial county EAB detections in North America

March 1, 2018

- Discovered in
 - Vermont Feb 2018
 - Orange
 - New Hampshire 2013
 - Concord



Jian Duan



Tetrastichus planipennis

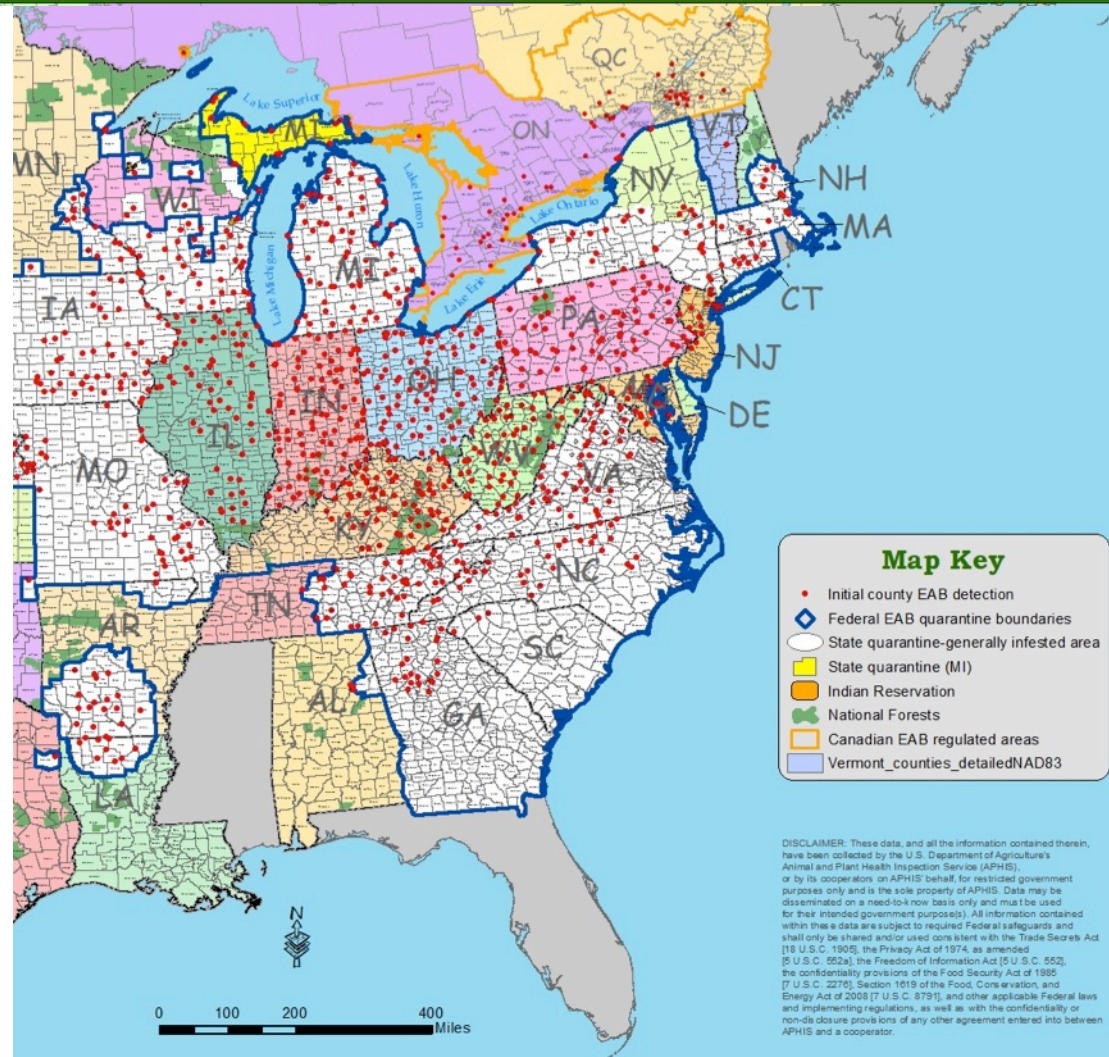


David

Oobius agrili

Spathius galinae

- Parasitoids
 - Establish
 - Protect the next generation on ash



Future directions

- We have carried out several additional studies in these plots including
 - EAB eggs were artificially placed on saplings in order to understand parasitism
 - We had close to 50% parasitism of these EAB larvae in saplings
 - These results indicate there is hope for the future of ash with biocontrol agents establishment
 - We have deployed additional monitoring methods in field plots to maximize efficacy of monitoring techniques
 - Yellow sticky traps – caught more parasitoids than yellow pan traps
 - Evaluated plots for nutritional sources associated with enhanced parasitoid establishment
 - Found an association of successful establishment with border privet
 - Evaluated plots for where parasitoids are spending time
 - Captured more parasitoids on tree boles of both large and small trees relative to traps in the canopy
 - We anticipate evaluating these plots in 2020 and every 5 years thereafter to evaluate if parasitoid releases and establishment are successful in retaining ash in these stands

Products

- This is a long term project and we will only just now be presenting results from this study at different conferences and outreach events
- A manuscript on this research is in preparation and expected finish date is May 2018
- The sapling study research is in preparation with an expected finish date of May 2018
- A McIntire-Stennis grant for evaluating floral and extra-floral nectaries was awarded to Dr. Greg McGee and Dr. Melissa Fierke, SUNY ESF in Spring 2013
 - A manuscript has been prepared on this research and is being submitted shortly
 - Another manuscript for work spinning off of this is in preparation and should also be submitted shortly