

Beech Bark Disease in Wisconsin

Holly A Petrillo

Associate Professor of Forest Entomology & Pathology

University of Wisconsin- Stevens Point

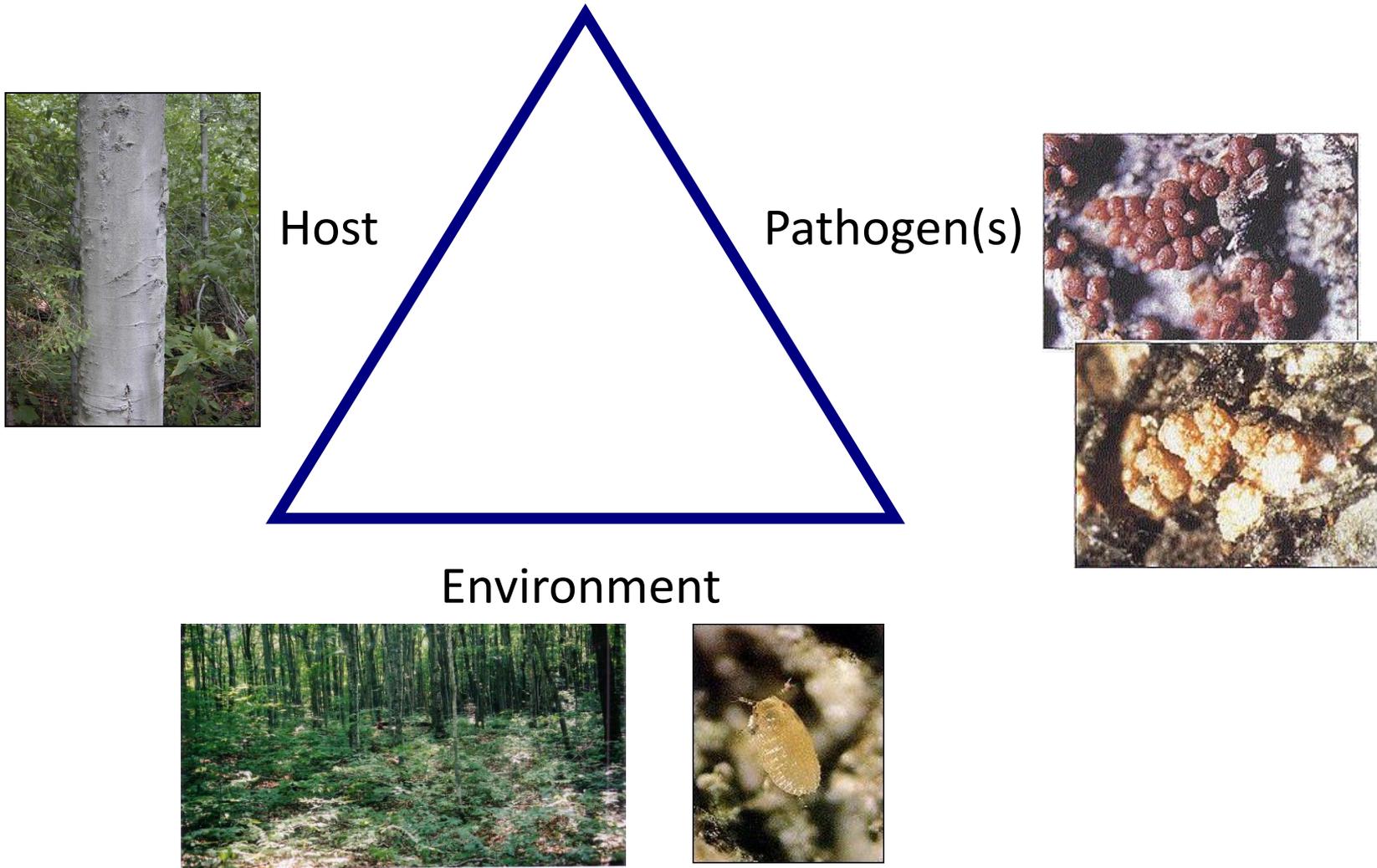


Outline

- Beech Bark Disease (BBD) biology & disease triangle
- BBD monitoring and impact analysis system
- BBD in WI, results 2011-13
- BBD monitoring 2014 & beyond



BBD Disease Triangle



Host:

American beech

Fagus grandifolia Ehrh.



Environment:

Exotic beech scale, *Cryptococcus fagisuga*



Tree characteristics affecting scale abundance

- DBH
- Tree age
- Bark characteristics
- Tree side
- Bark nitrogen
- Area of live bark
- Other organisms colonizing bark



Pathogen(s)

- Several species ascomycete fungi in genus *Neonectria*

- *N. faginata* (exotic)



- *N. ditissima* (*N. galligena*) (native)



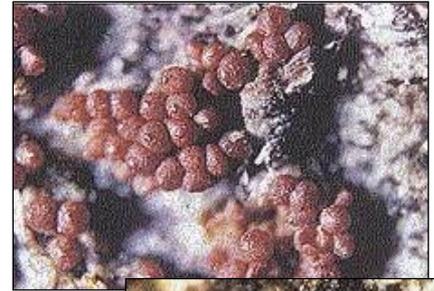
- *N. ochroleuca* (now *Bionectria ochroleuca*)



Factors influencing scale & pathogen presence

- Proximity to other local scale and *Nectria* infestations
- Wind patterns
- Continuity & density of beech stands
- Movement of scales and *Neonectria* on ornamental trees, firewood, and vehicles
- Spread by mammals, birds, and other organisms





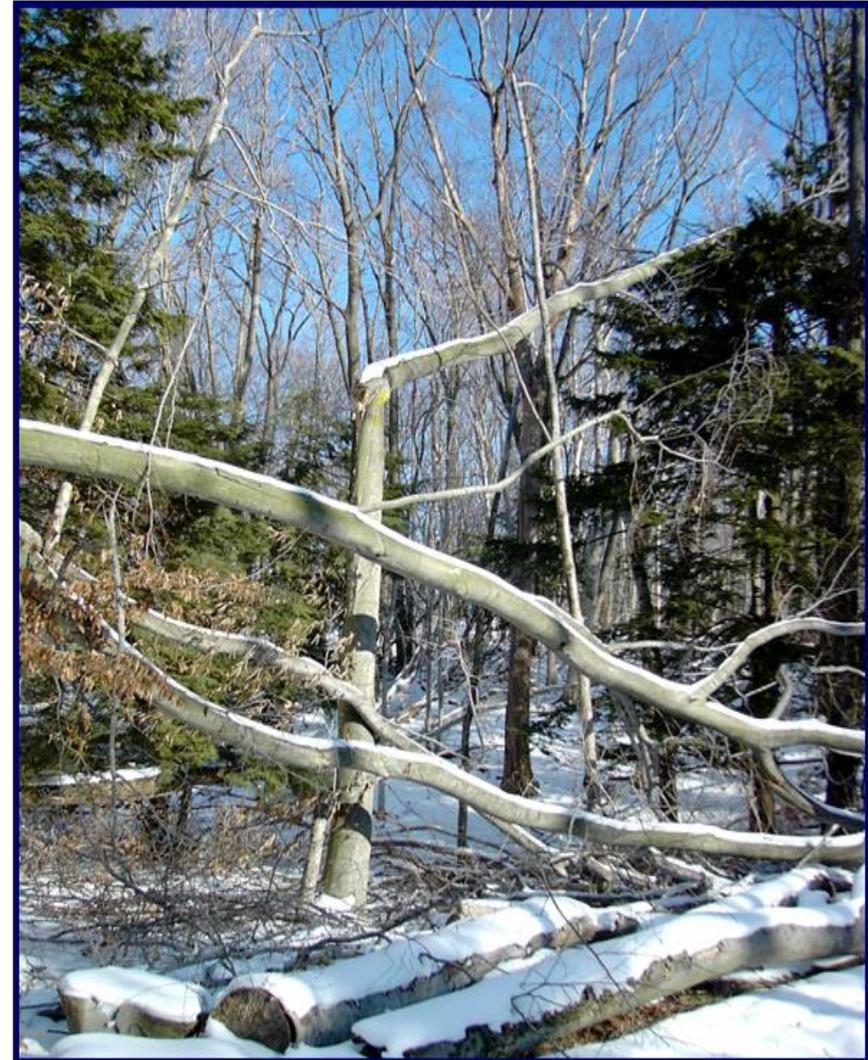
Three stages of BBD invasion

- Advancing front
 - Beech scale only; ~6 miles/ year
- Killing front
 - *Neonectria*, American beech mortality
- Aftermath forest
 - Extensive mortality, defects in residual trees

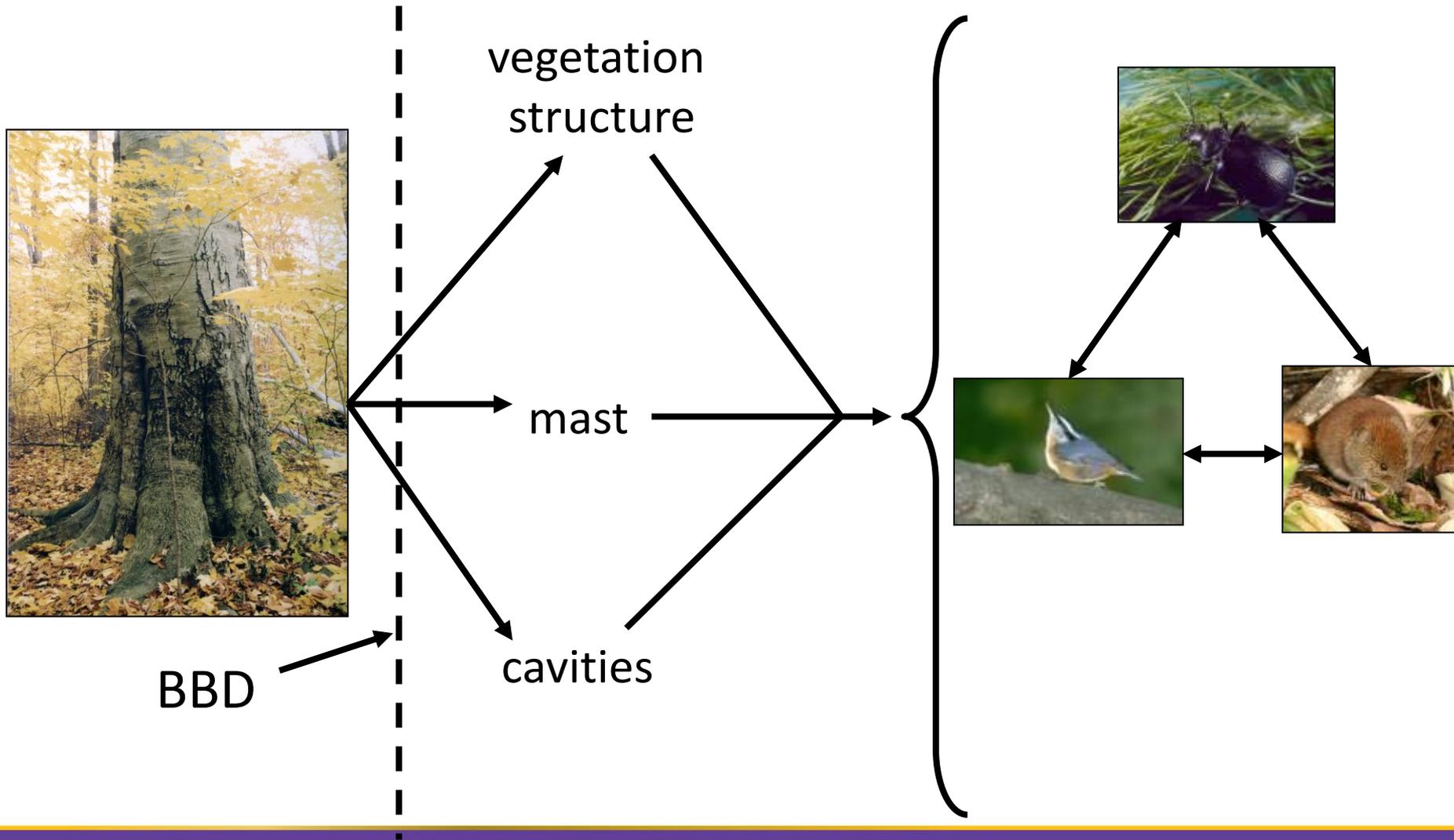


Life in the aftermath forest

- High beech mortality
- Release of beech sprouts
- Dense thickets of beech
- Resistant beech



Ecological impacts of BBD on wildlife



BBD

vegetation structure

mast

cavities

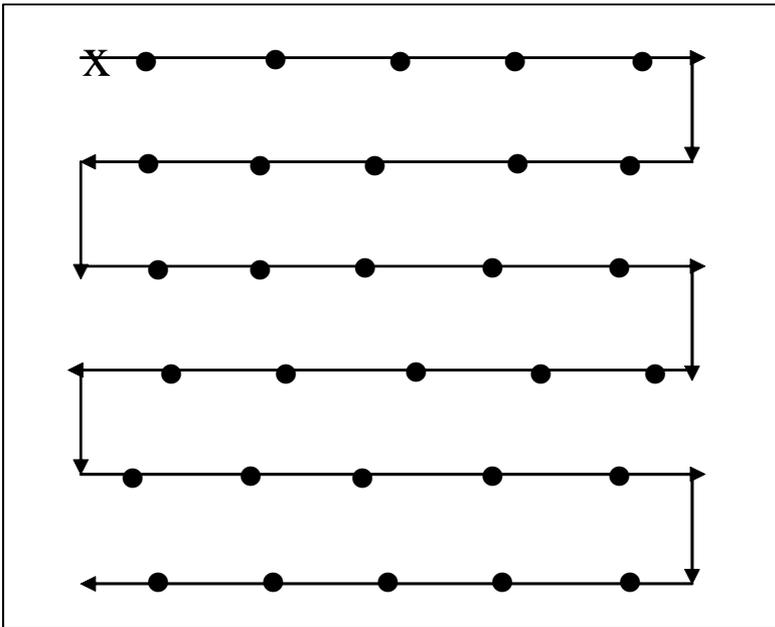


Beech Bark Disease Monitoring and Impact Analysis System

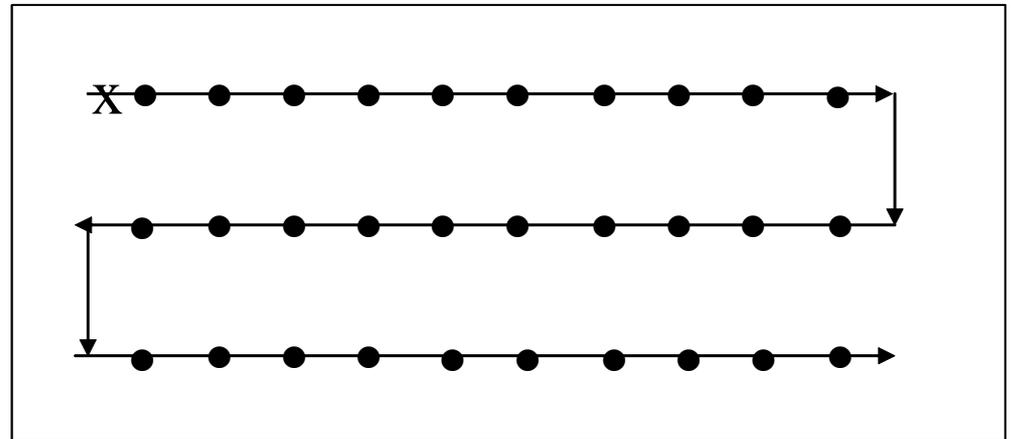
- Extensive plots
 - Only beech trees measured
- Intensive plots
 - All species measured for health



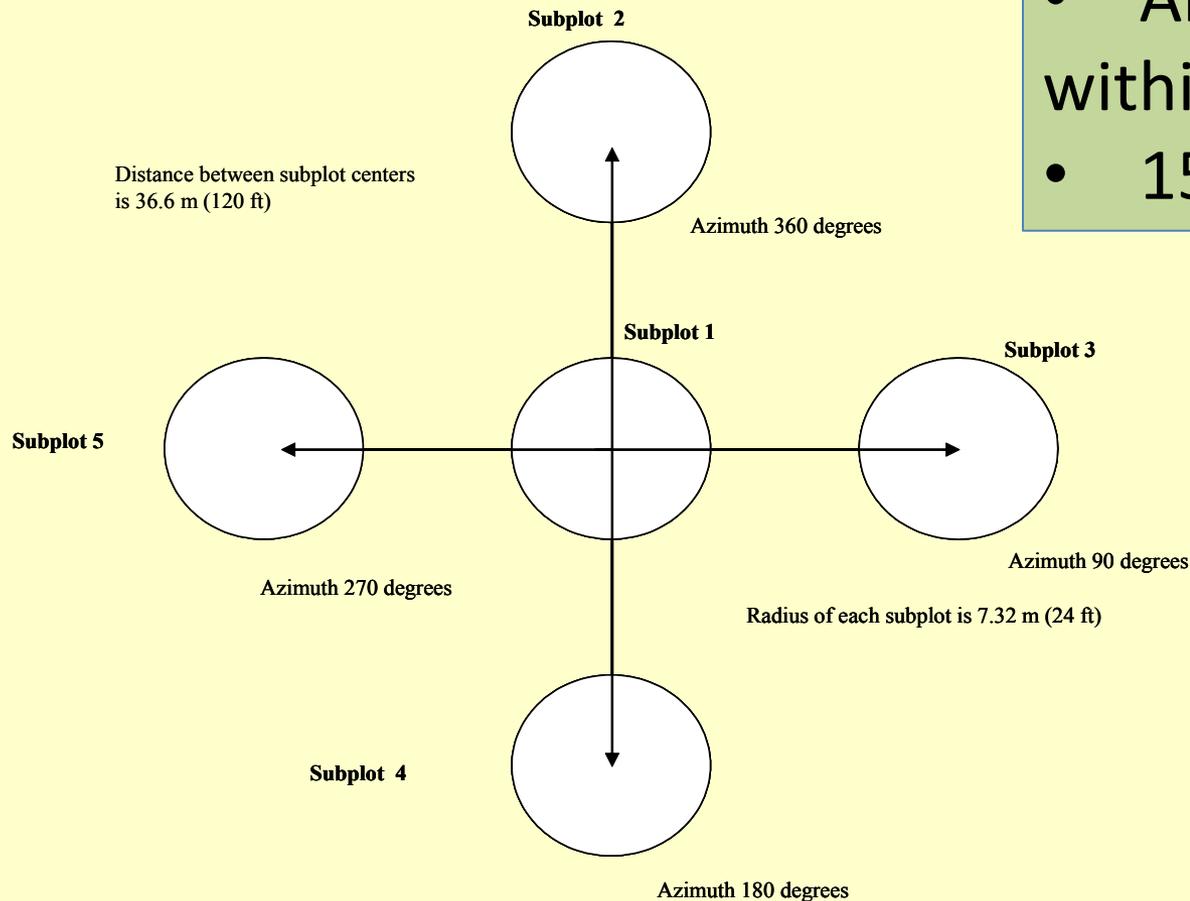
Extensive Plot Design



- 30 prism points= 30 beech measured/ stand
- 79 plots established



Intensive Plot Design



- All species measured within plots
- 15 plots established



Field measurements

- Basal area
- Live crown ratio
- Foliage transparency & density
- Crown dieback
- Light exposure
- Vigor
- Crown class
- Up to 3 damages
- Beech scale on NESW sides of tree



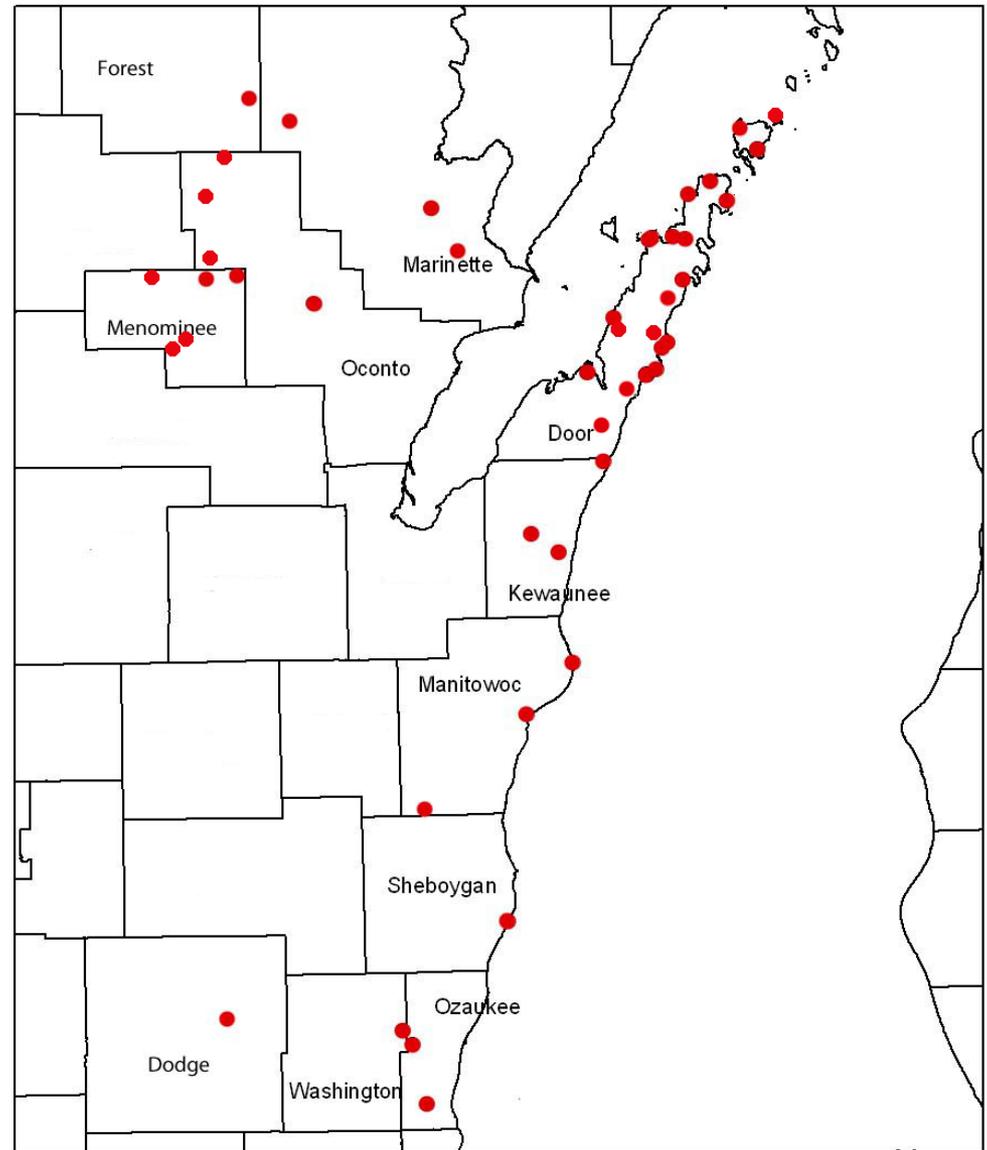
BBD in Wisconsin

- Beech scale first detected in Door County, 2009
- Beech scale found in 9 counties, 54% of plots
- No detection of *Neonectria perithecia*



Current beech scale distribution in Wisconsin

Beech scale detections as of December 2013



0 4 8 16 Miles
[Scale bar]



Plot locations & beech scale presence by County

| County | # plots total | # plots w/ scale | % plots w/ scale |
|-------------|---------------|------------------|------------------|
| Dodge | 1 | 1 | 100 |
| Door | 30 | 20 | 67 |
| Fond du Lac | 1 | 0 | 0 |
| Forest | 3 | 1 | 33 |
| Langlade | 1 | 0 | 0 |
| Manitowoc | 4 | 2 | 50 |
| Marinette | 5 | 1 | 20 |
| Menominee | 22 | 8 | 36 |
| Oconto | 5 | 5 | 100 |
| Ozaukee | 6 | 4 | 67 |
| Sheboygan | 1 | 1 | 100 |



Impact of BBD on tree health in Wisconsin

- Beech makes up 5-47% of stands sampled
- Most scale populations very low
- Door County, Nicolet National Forest
 - Highest beech scale populations
 - Highest % trees/stand with beech scale
 - Highest beech mortality (Door County)





BBD-Resistant trees

- 1-5% American beech resistant



Ongoing work

- Data analysis, risk assessment of uninfected areas
- Apply for more funding to continue sampling in the future
- Development of guidelines for decreasing scale movement & impact

