

# Beech Bark Disease Update



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# Beech Bark Disease

- Agent: Sap-feeding  
Exotic Scale
  - Scale is dispersed by wind  
& birds
- Disease: Native & Non-  
native Fungi - *Nectria sp.*
  - Wind borne spores



# Three Stages of Invasion

- Advancing Front
  - Scales only
  - 6 miles / year
- Killing Front
  - *Nectria* & Mortality
- Aftermath Forest
  - Few trees; defects & decline in residual trees







# Beech Blight Aphid



# Lichens not Beech Scale





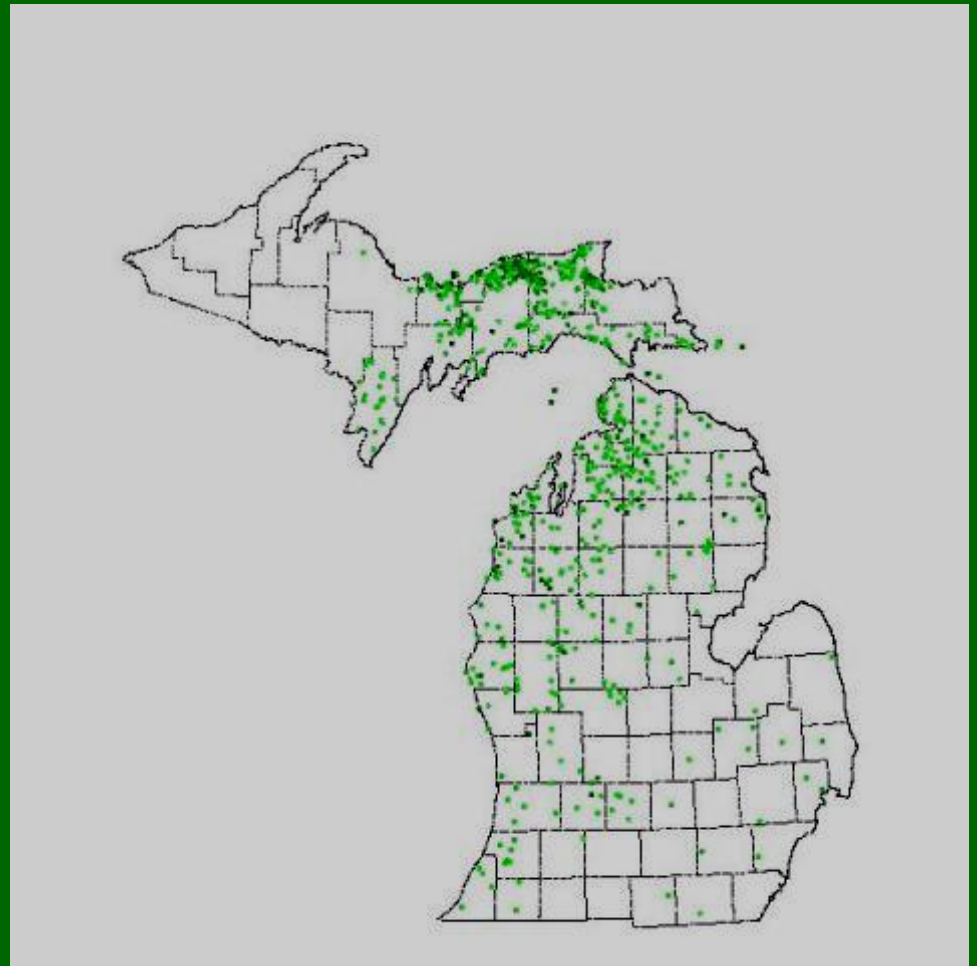
# Michigan's Beech Resource

## 7.2 million acres of Maple-Beech-Birch type

- 138 million beech in all size classes.
- 15 million beech trees > 9 inches dbh

## Projected first front losses

- 7.5 million trees > 10"
- 800 million board feet



- **American Beech**
  - 3% of the hardwood volume
  - 1.8% of all species volume.
- **Beech + Ash**
  - 9% of the hardwood volume
  - 5.5% of all species volume



# Beech Nuts: **Important Hard Mast**



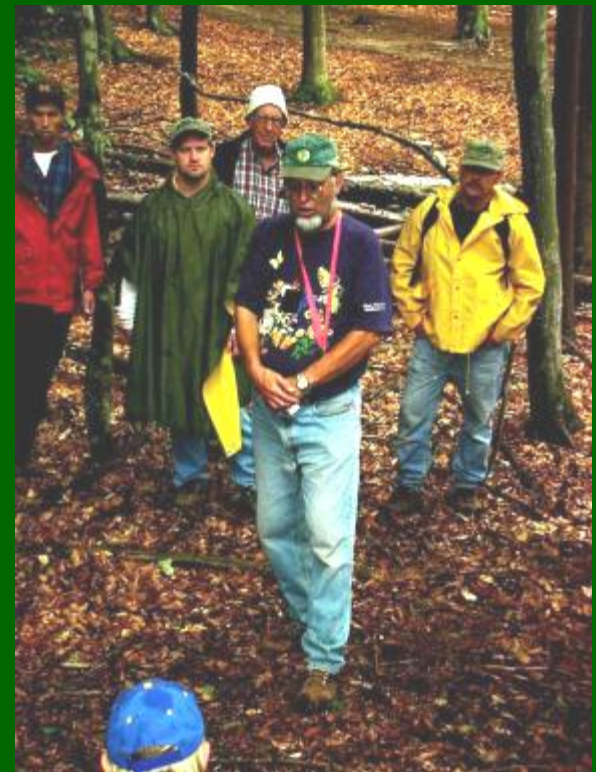
# Evaluation Monitoring

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- Evaluate beech decline and mortality
- Determine the relationship between BBD, impacts and tree, stand and site variables
- Help define advancing and killing fronts
- Evaluate scale spread rates

# Beech Bark Disease in Michigan: The Off-Plot Detection Effort

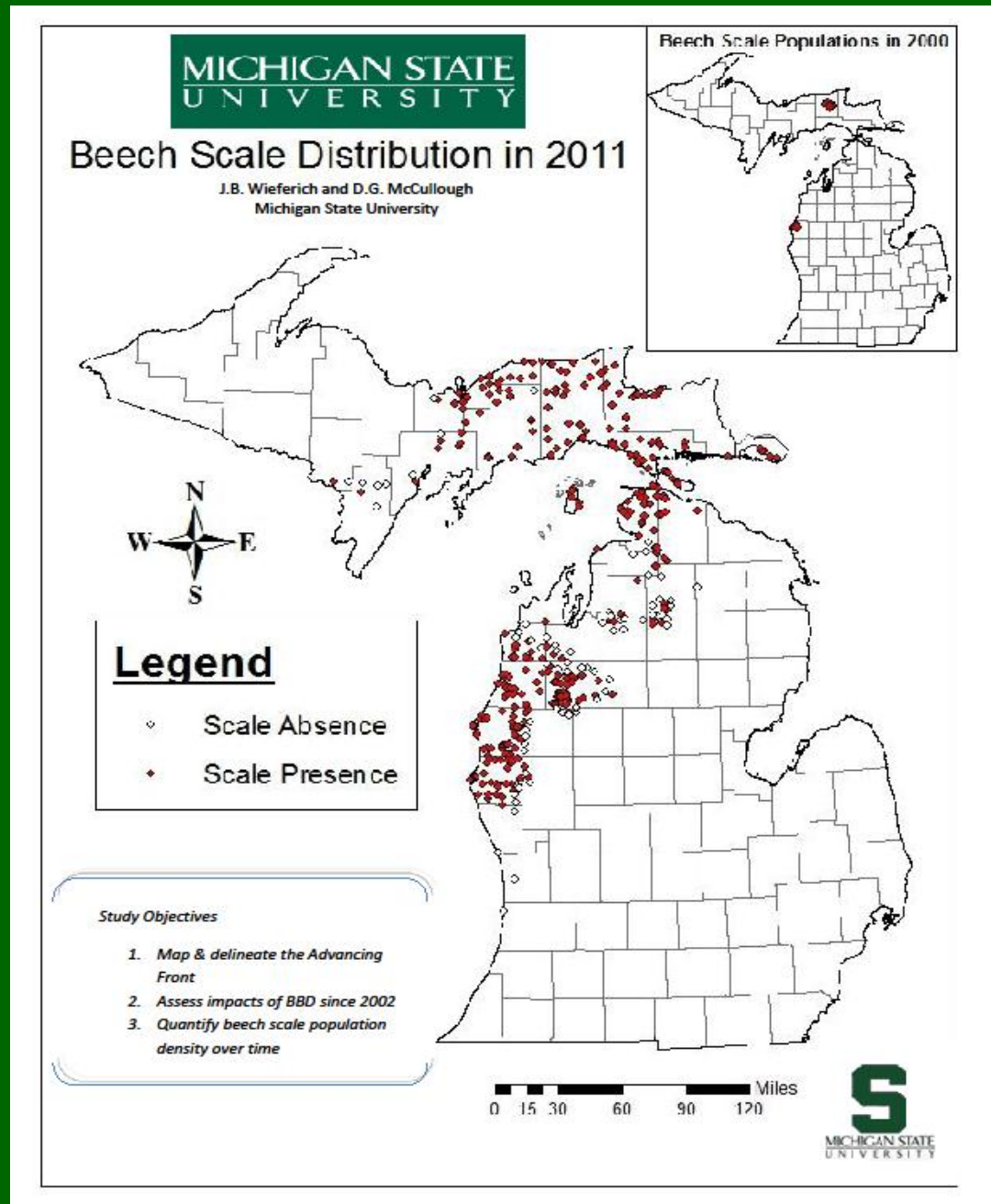
- Training and Technology Transfer
  - Several on-site training sessions for resource professionals by SP&F and MI DNR staff.
  - Objectives include pest identification, impact assessment & hazard tree management.



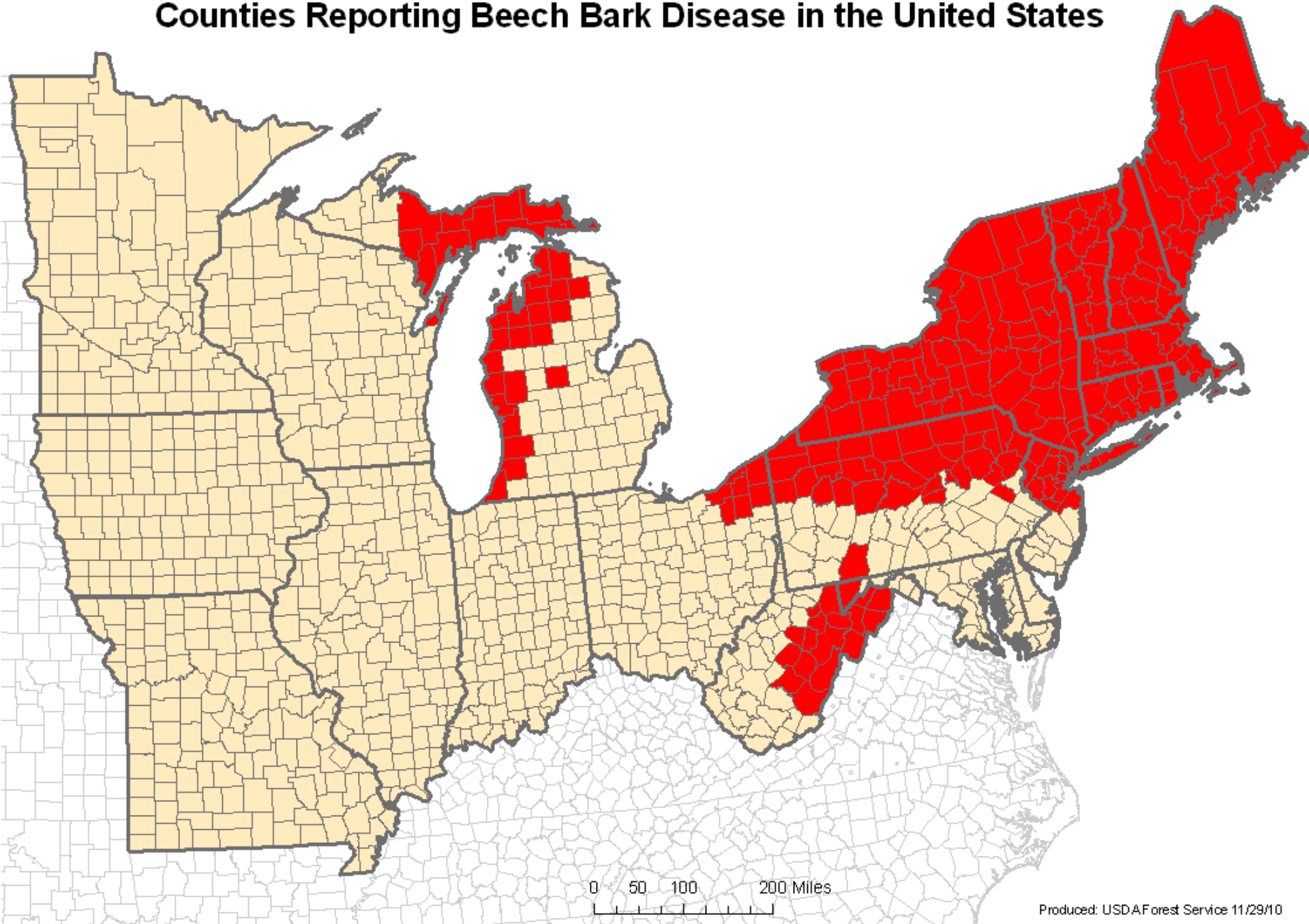
# DISTRIBUTION

In the decade from 2000 to 2011, BBD has spread through most of the range of beech in Michigan...but it is not everywhere. So...

- Hauling restriction to uninfested areas from July through the first snowfall makes sense



# Counties Reporting Beech Bark Disease in the United States



0 50 100 200 Miles

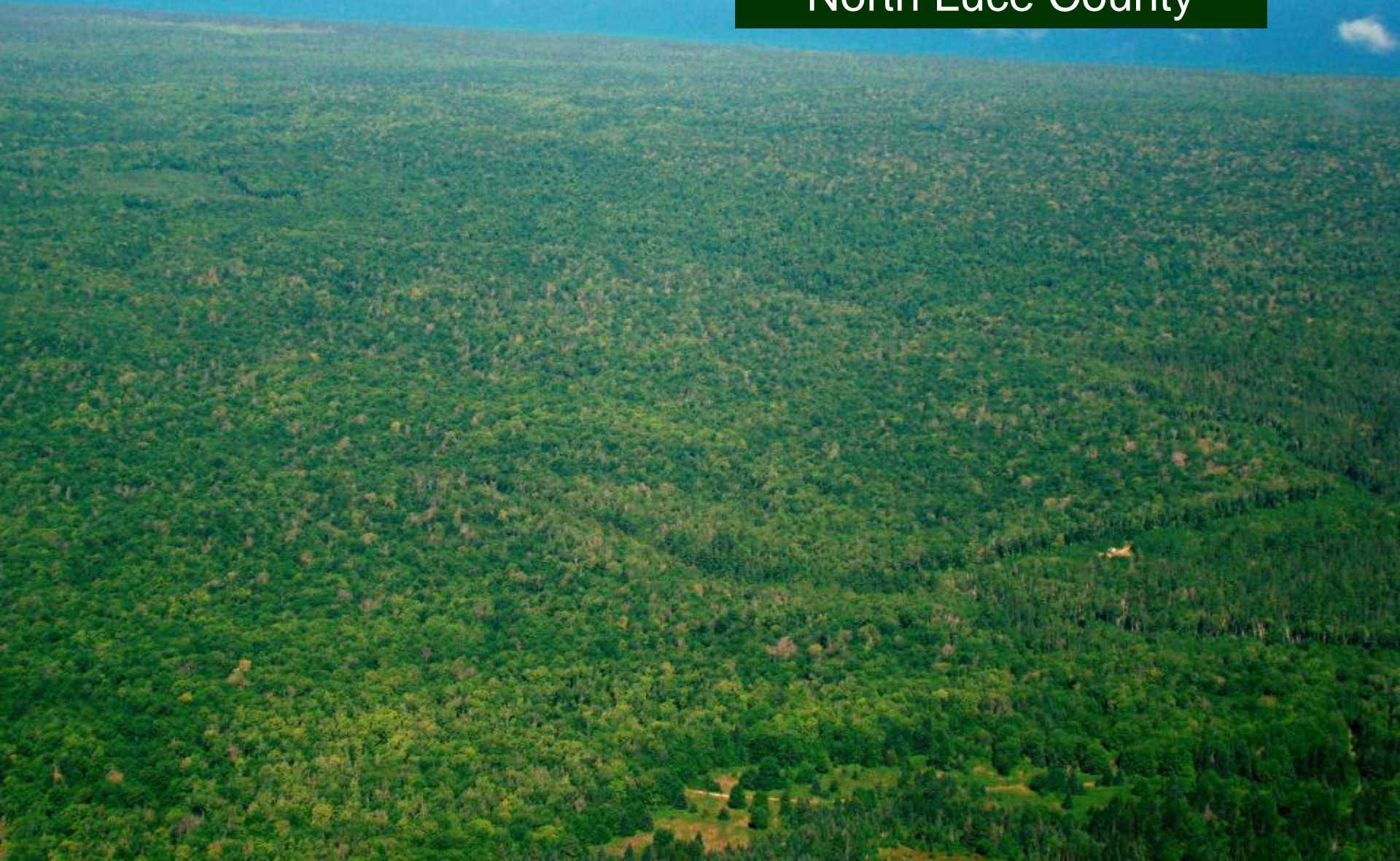
An aerial photograph showing a dense green forest with several scattered lakes of varying sizes. The water in the lakes is a deep blue. In the upper right corner, a portion of a blue helicopter rotor blade is visible, indicating the photo was taken from a helicopter. The overall scene is a lush, natural landscape.


Pretty Lakes, Luce County  
2002





2011 Aerial Survey  
Beech Decline/ Mortality  
North Luce County



An aerial photograph of a dense forest, likely a beech forest, showing a mix of green and brownish-green patches. A dark green rectangular text box is overlaid in the bottom right corner.

2011 Aerial Survey  
Beech Decline/ Mortality  
North Luce County

# Beech regeneration mixed with striped maple



# How to get desirable regeneration

- Beech will get BBD, die, and regenerate
- Other, less desirable species may also invade the site—sometimes in great numbers
- Some hard questions face landowners:
  - How valuable is the site?
  - How hard will I fight for it?
  - How much will/can I invest to maintain the values I desire?
- Answers aren't easy, or simple

# Finding the Right Answer

- Stands will likely need help to regenerate adequately to desirable species such as:
  - Stump treatments
  - Herbicide treatments
  - Planting of other hardwood and softwood species
  - ?
- Stands not given the proper stewardship at this critical time may well be lost as far as our primary values are concerned.
- Research is needed to determine the correct course of action to properly regenerate these stands. Too much is at stake to simply wait and see what happens. We can't afford decades to recover from a mistake in stewardship that robs the productivity of our forest lands for wildlife and timber, among other values.

# Beech Silvicultural Guidelines

- A ten year window is used as the minimum time needed for a stand to build adequate basal area for another selection harvest.
- BBD => 40 mile buffer



# Beech Silvicultural Guidelines

- UNINFESTED → Greater than 40 miles from advancing front
  - Beech > 10% of total stand BA
    - Reduce – don't eliminate - BA of overstory beech
    - Keep beech needed to maintain  $\geq 70$  sq. ft.
    - Maintain beech for mast and future habitat
    - Discriminate against large, overmature and decaying beech
    - Retain vigorous beech with smooth bark
    - Minimize damage to beech root systems during harvest
    - Monitor regularly for presence of scale



# Beech Silvicultural Guidelines

- Stands < 40 miles from advancing front
  - Beech < 10% of total stand BA
    - Impacts on stand are offset by benefits of retaining beech for wildlife and diversity
    - Leave large snags for cavity nesters

# Beech Snap - Reason for:

- Hazard Tree Management
- Salvage Cutting



Bass Lake Campground  
Closed to remove  
Hazardous Beech  
2001



# Resistance Research

- USFS Research Lab,  
Delaware, OH
  - Collect scions
- MSU - Reporting form
  - database
  - > 9" dbh
  - # tag & painted "R"
  - leave a buffer



# Michigan's Upper Peninsula

## First Resistant Tree at initial detection site



Light green lichen  
on many resistant  
beech



Not all resistant trees have smooth bark



# BBD Resistance

- Seed collected from:
  - open-pollinated resistant parent
  - open-pollinated susceptible parent
  - susceptible parent cross-pollinated with a resistant parent
  - pairs of resistant parents cross-pollinated with other resistant parents
- Families with highest proportion of resistant seedlings = two resistant parents
- Includes the open-pollinated family from the resistant tree in Sebois County, Maine
  - provides evidence that management directed at the removal of diseased trees can lead to stand improvement.

# BBD Resistance

- MDNR / MTU - Identify resistant beech trees and collect dormant scions
- Delaware - Scions are grafted to beech seedlings using a hot-callus grafting technique.
- Goals:
  - a seed orchard
  - maintain an acceptable level of genetic diversity
  - 20 different resistant trees
  - seed orchard = 300 trees with 15 ramets of each of the 20 resistant genotypes
- To date, scions from 24 different resistant trees from MI
- Once grafted, 3 ramets of each genotype are tested for beech scale resistance
  - place scale eggs against the bark on foam pads.



# BBD Resistance

- 12 tested genotypes have confirmed resistance.
- 68 grafted ramets of these 12 genotypes ready to plant fall, 2010.
- 130 additional grafts will be planted fall, 2011.
- By winter of 2011 - reach goal of 300 total grafted ramets
- complete seed orchard design in 2012 and 2013.



Burrs developing on greenhouse pollinated grafted beech

Foam traps provide a favorable environment, resulting in enhanced egg-laying



Six-month old cross-progeny seedlings being challenged with 50 egg sac foam pads.

# Brighton Tree Improvement Center

## Preparing for first planting of resistant stock

Burrs developing on  
greenhouse pollinated  
grafted beech

200 resistant beech  
seedlings from the  
Delaware, OH. lab  
will be planted in a  
block near the Cut  
River in 2012

Block plantings  
encourage cross-  
pollination



# What Can You Do?

- Don't move infested beech firewood, pulpwood, or sawlogs from infested areas to non-infested areas during the period from July 1 to the first snowfall
- Follow the beech management guidelines on state forest lands and to the extent that they coincide with the goals and situations of other landowners
- Be alert for Resistant Trees and report them
- Report BBD when it is found in a new location
- Support research into regeneration options in any way possible

Thank you



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