Annosum root rot
Biology and Impact
a Wisconsin Perspective

Michigan SAF, October 2014

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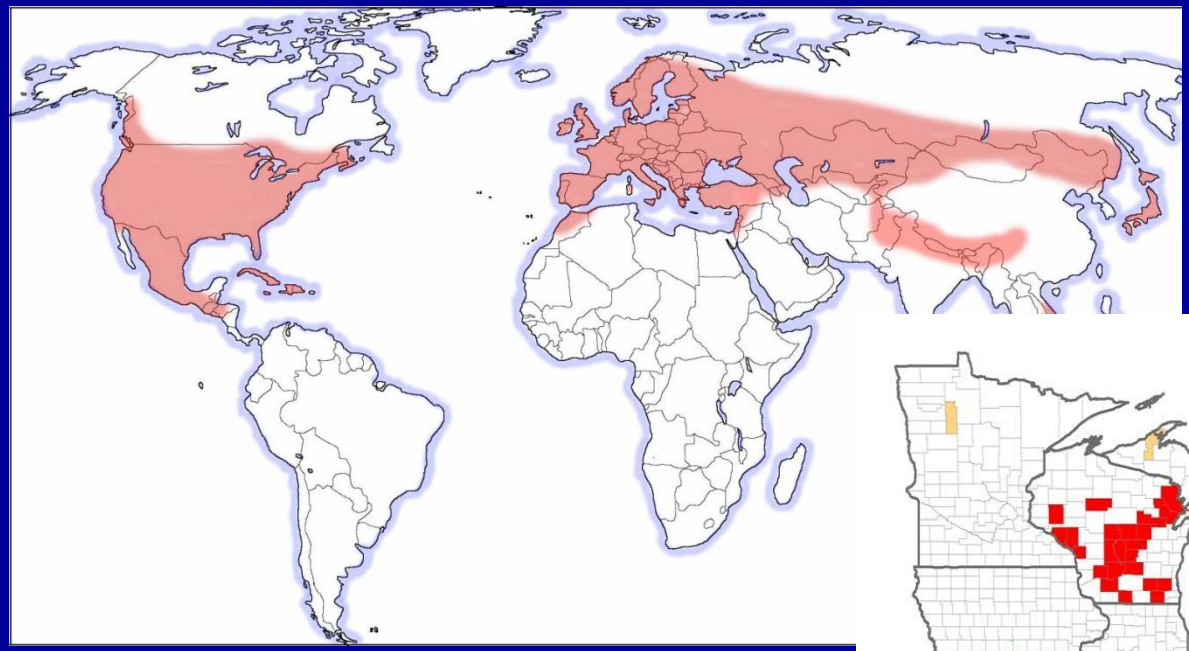
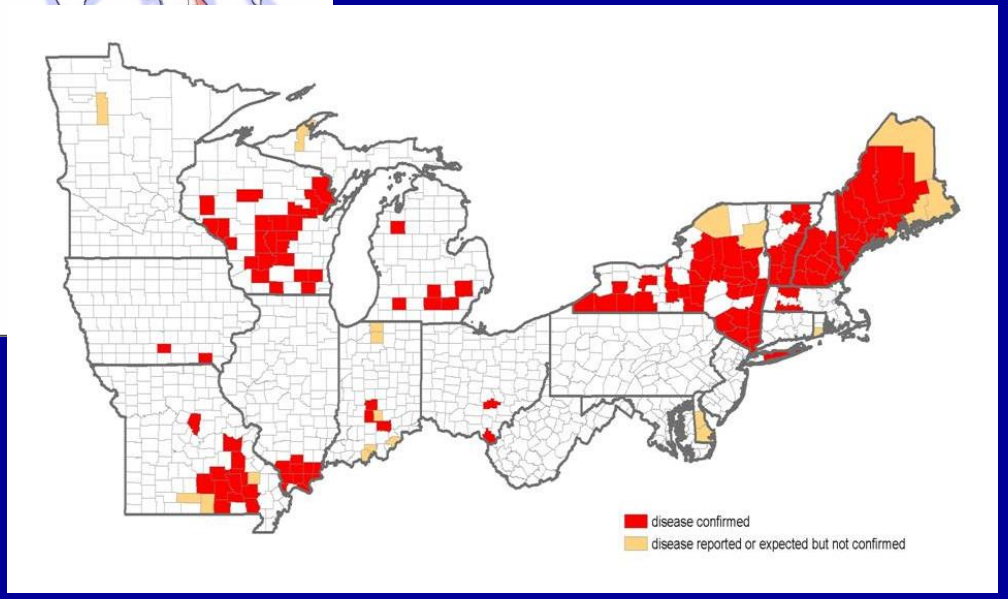
What is “ANNOSUM ROOT ROT”?





Caused by a fungus

Heterobasidion irregulare

Formerly H. annosum

Formerly Fomes annosus

Annosum root rot
= Annosus root rot
= Heterobasidion root disease (HRD)

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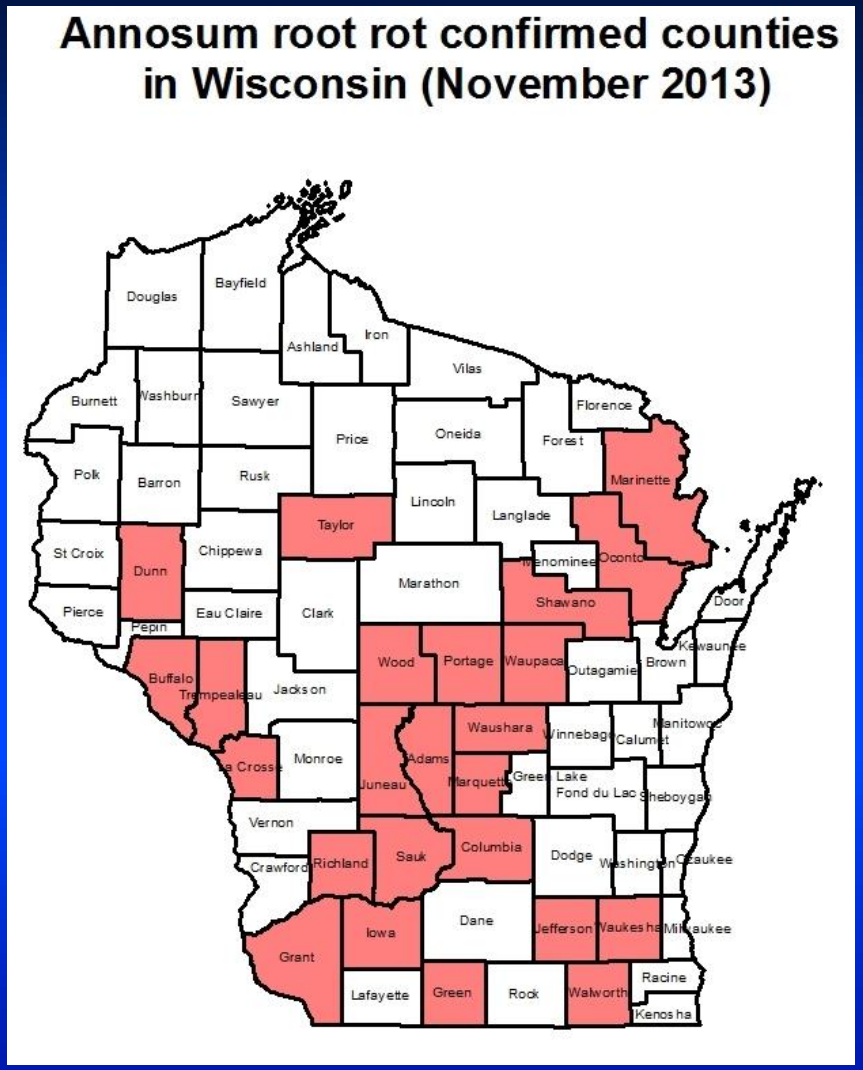
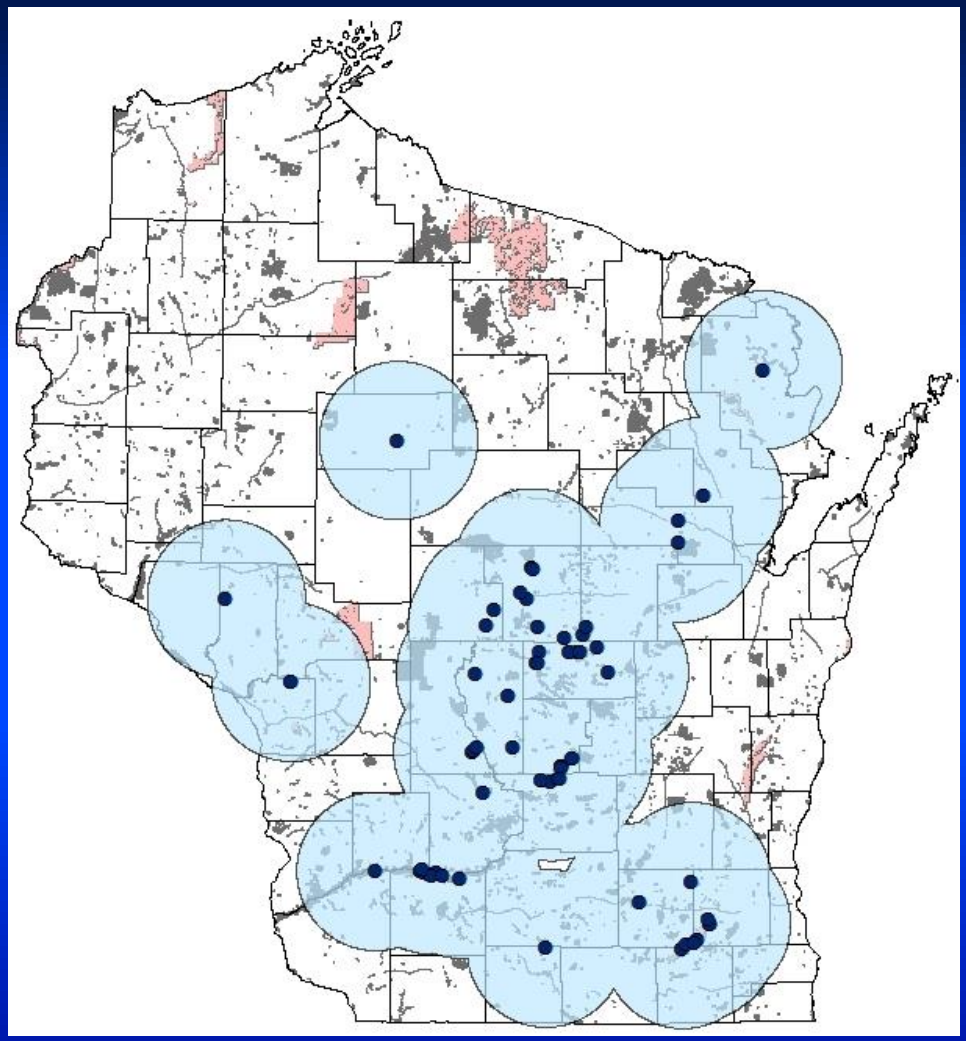
Confirmed stands in WI





First identified in WI in 1993 – now in 24 counties

A major disease of conifer plantations

- Thinned stands are most at risk

Red pine plantation with Annosum

White pine plantation with Annosum

Tree species found with H.irregulare fruit bodies in the field in Wisconsin

Pinus resinosa (red pine) - mortality
Pinus strobus (white pine) - mortality
Pinus banksiana (jack pine) - mortality
Abies balsamea (balsam fir) – mortality
Juniperus virginiana (eastern red cedar) – mortality

Picea sp. (spruce) – no mortality observed but probable decay
Prunus sp. (cherry) – no mortality observed but probable decay
Quercus sp. (oak) – no mortality observed but probable decay
Buckthorn – no mortality observed but probable decay

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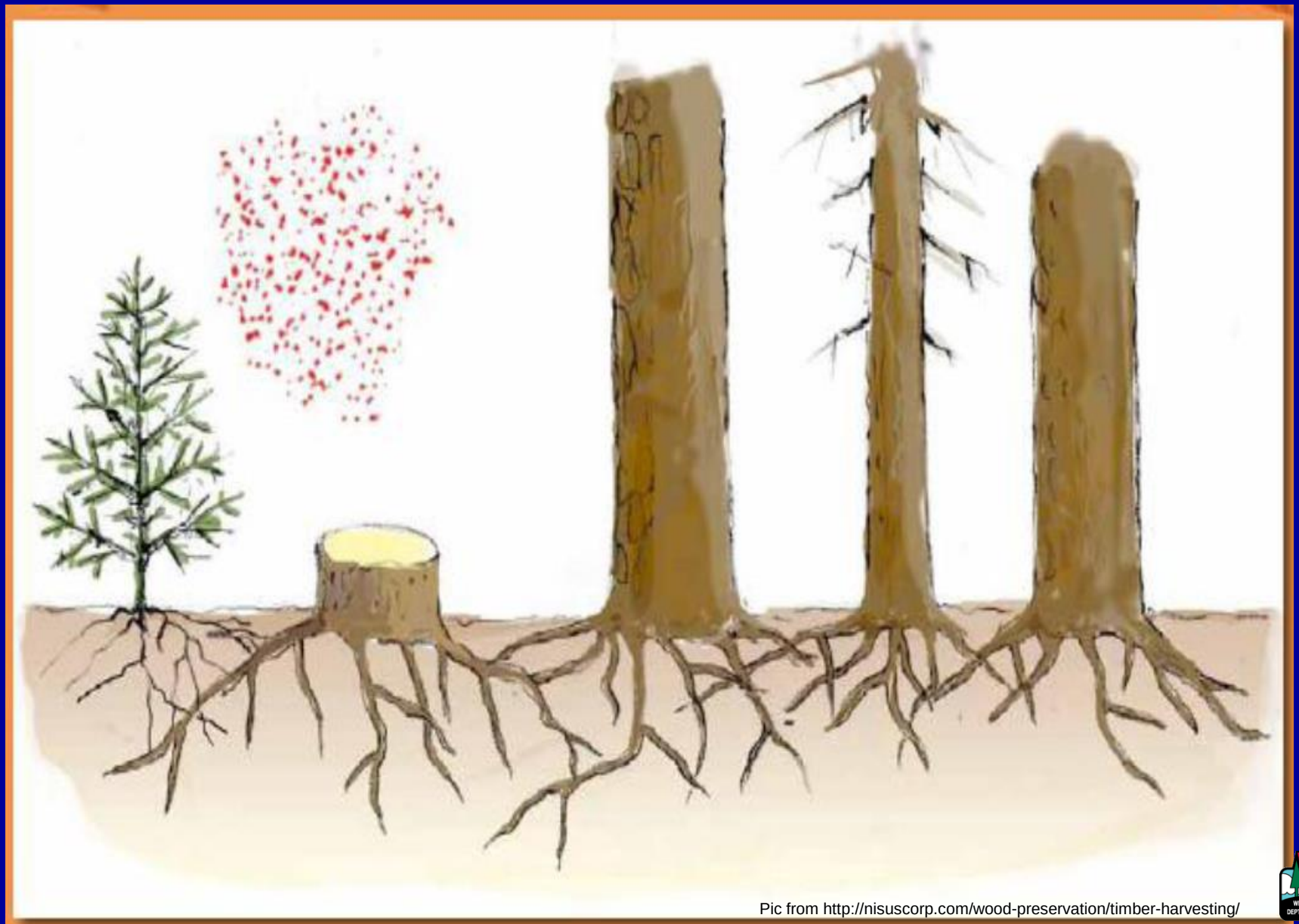
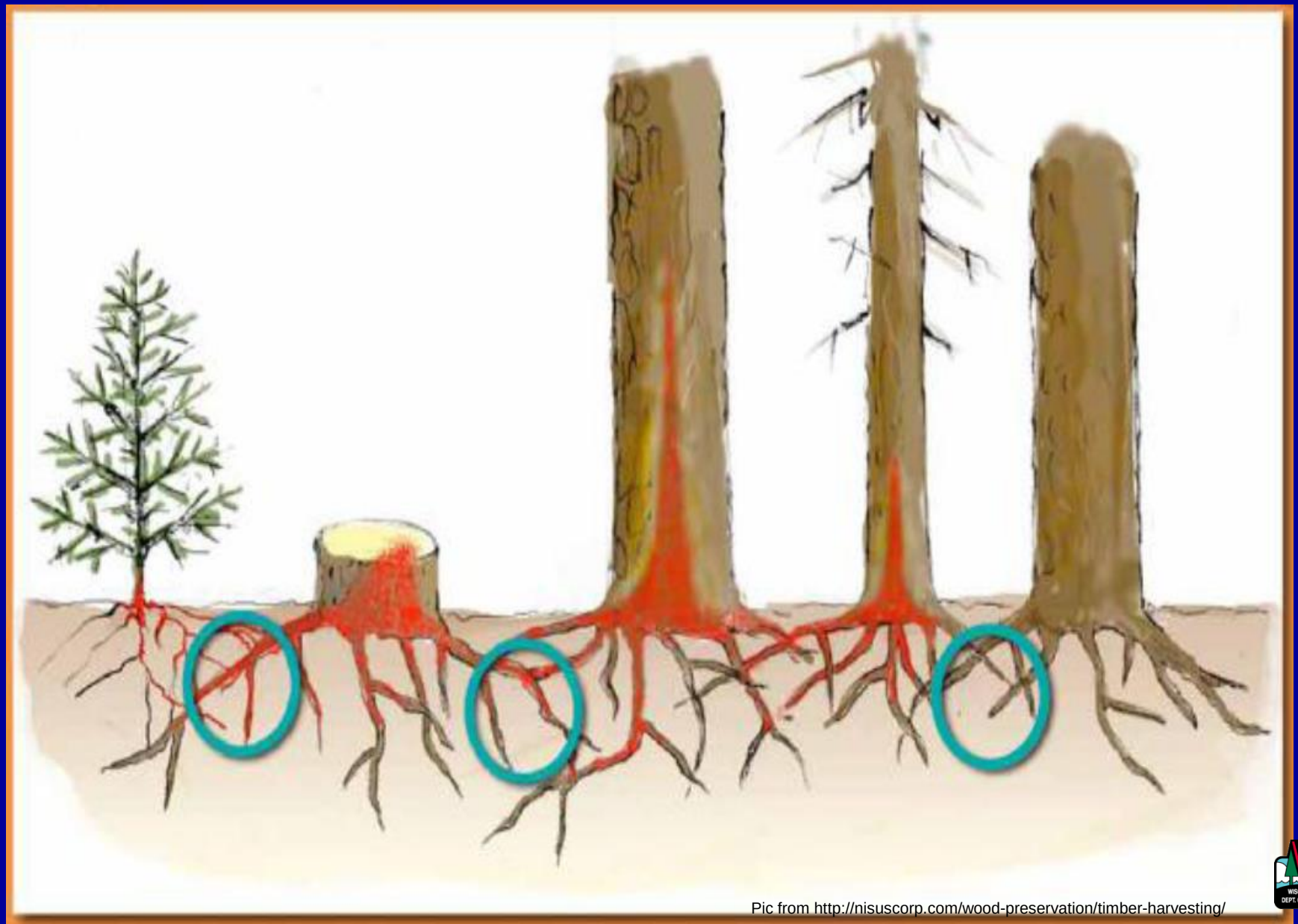
Mode of spread – by airborne spores



Pic from http://nisuscorp.com/wood-preservation/timber-harvesting/

Mode of spread – by root contacts



Pic from http://nisuscorp.com/wood-preservation/timber-harvesting/

Signs & Symptoms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Looking for Annosum fruit bodies

Fruiting bodies are often hidden under duff layer attached to main trunk

late summer to early winter is best time to observe conks

Popcorn stage of Annosum

Resupinate “flat” conk


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Fruiting bodies

- Old stumps
- Dead trees
- Seedlings/saplings
- Logs in contact with ground
- Or, fruiting may not be present

Also kills understory saplings

White pine

Red Pine


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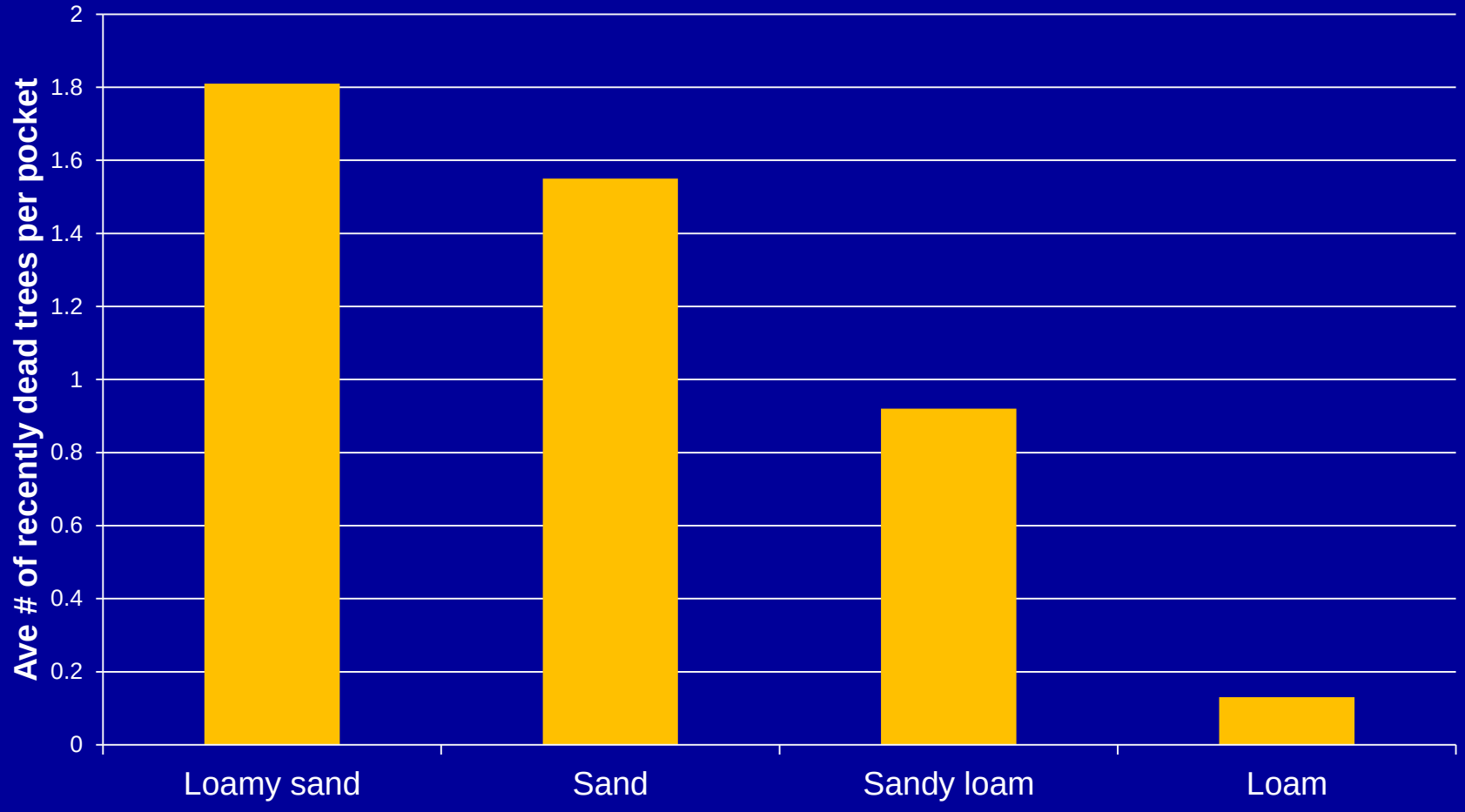
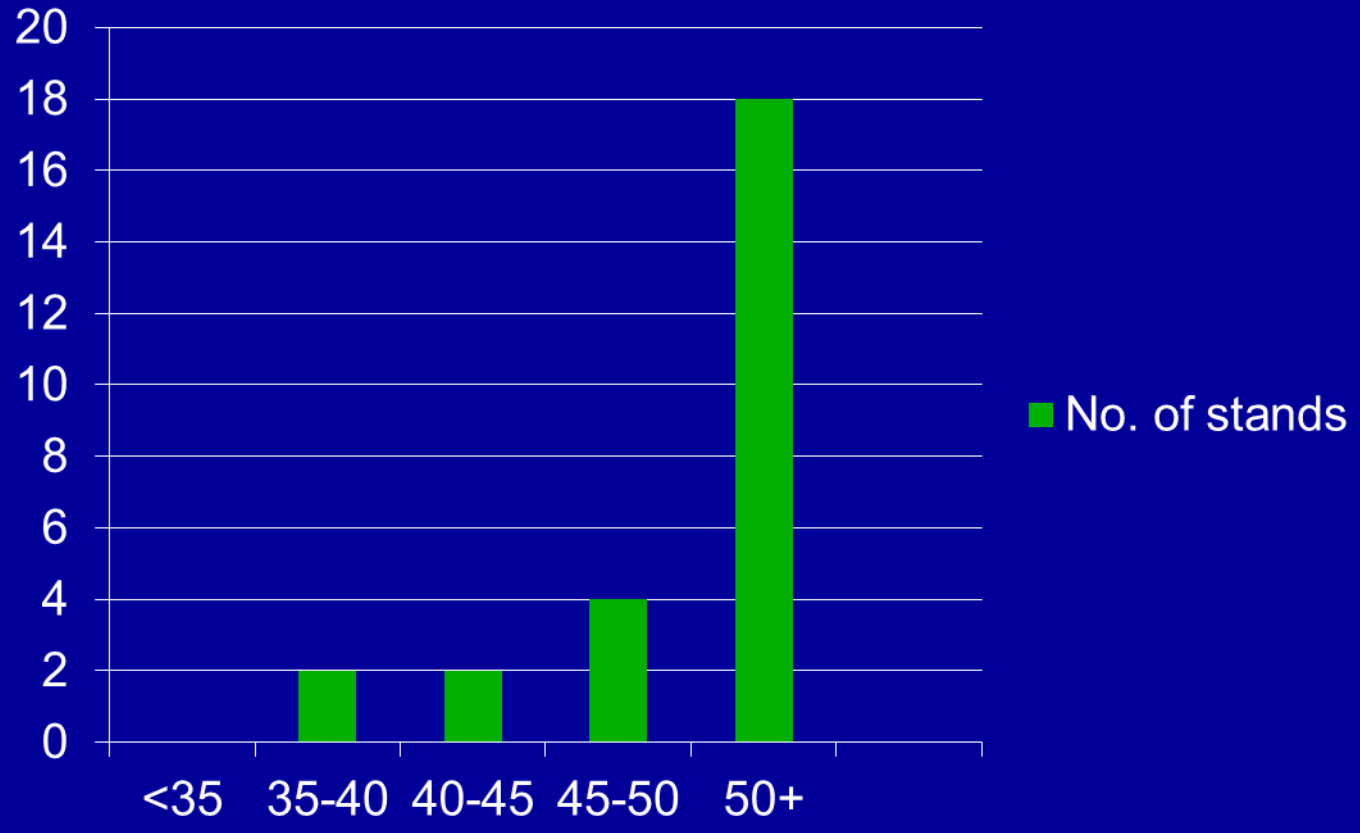
How damaging is the disease?

- Surveyed stands with annosum
- # of confirmed pockets per acre: 0.1-4.7 pockets per acre (average 0.7 pockets per acre)
- Ave # of affected trees per pocket: 1-22 trees per pocket (average 5.5 trees per pocket)
- Ave # of recently dead trees per pocket: 0.1-7 trees (average 1.5 trees per pocket)

More recently dead trees on sandier soils



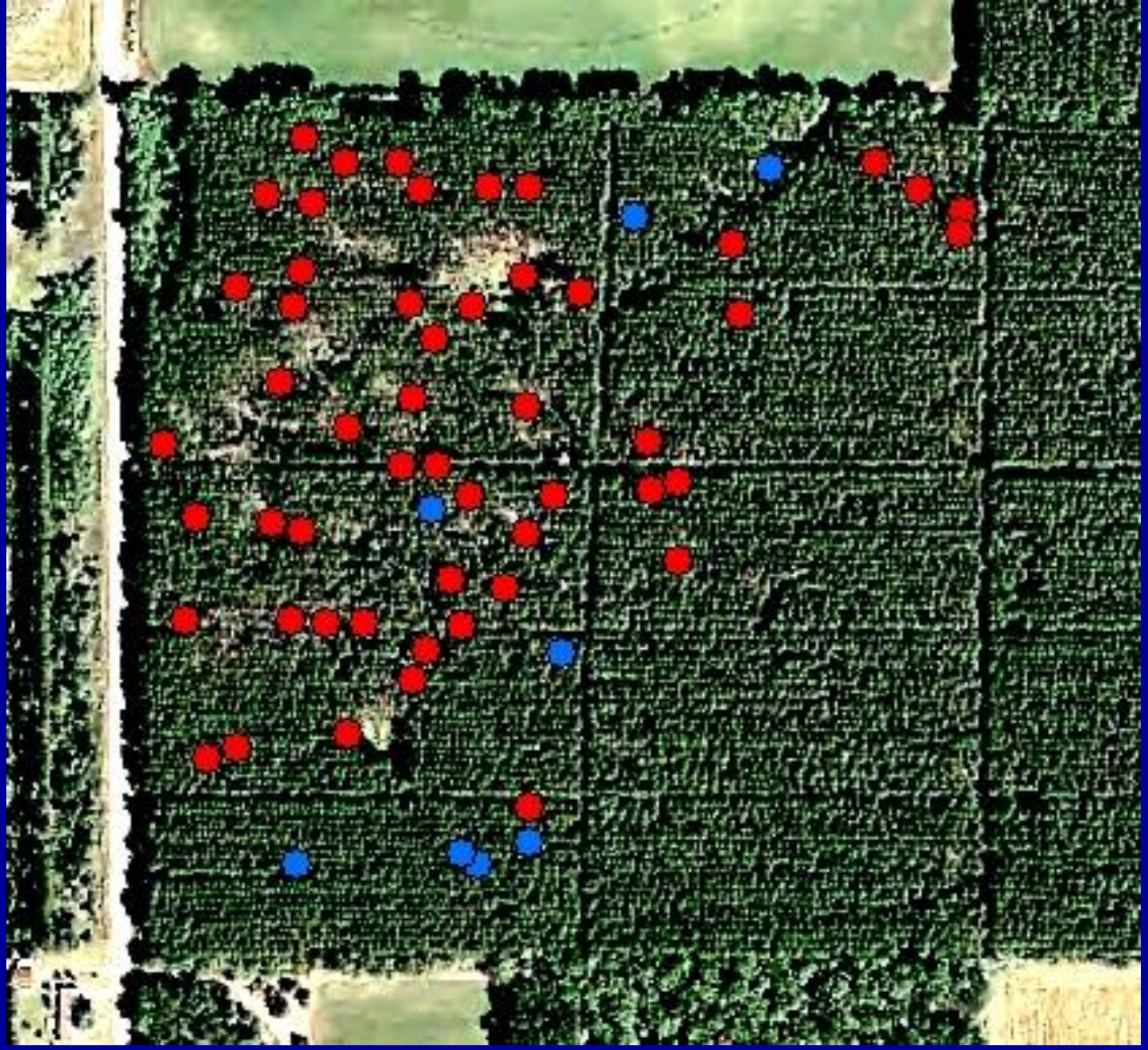
Plantation age with the disease



N=36

Impact to the stand can be variable, from one or two pockets to many pockets

Established 1958 Detected 2007 thinned 3 times (thinned in 2001)



52 confirmed pockets in 40 acres

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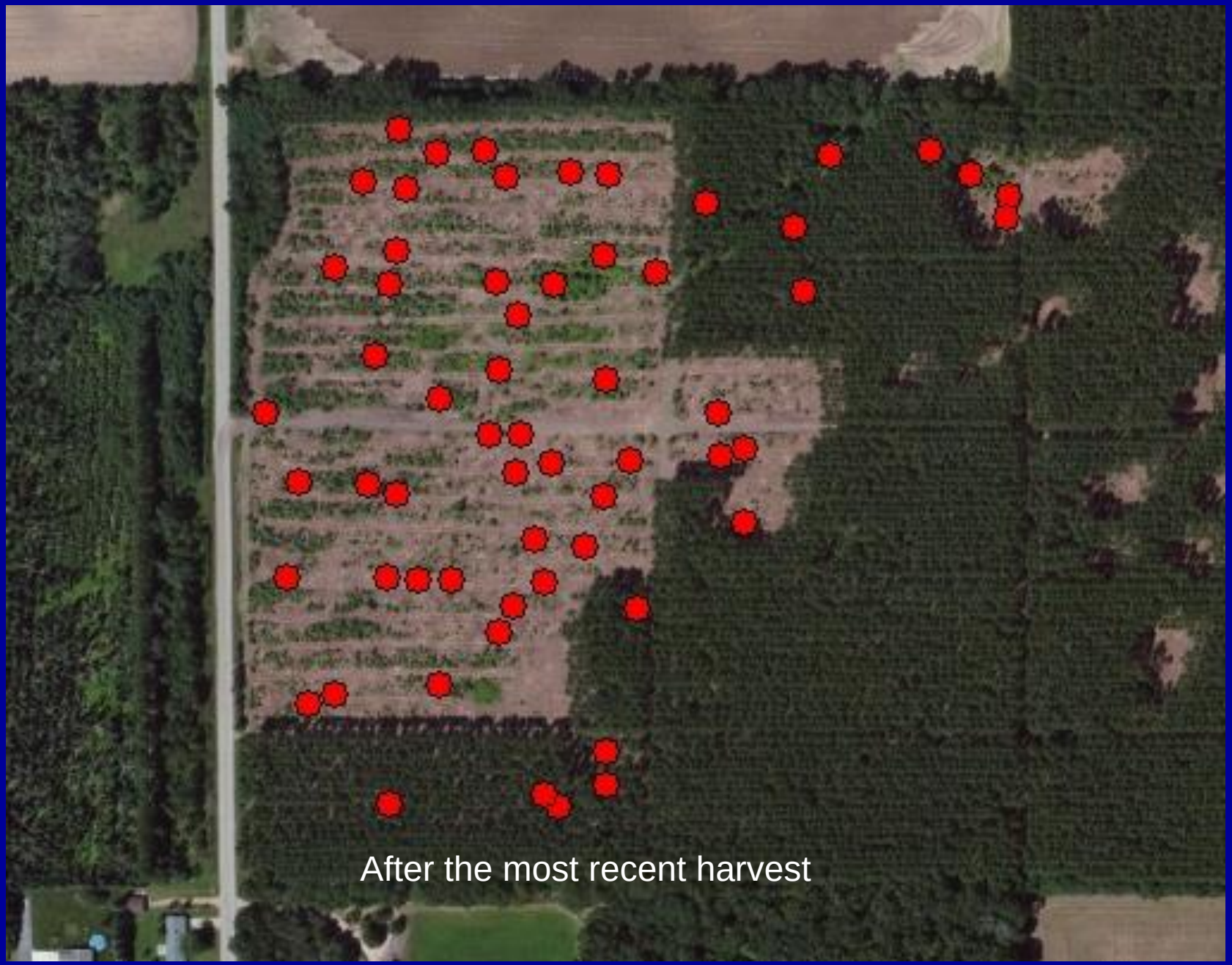
After the most recent harvest

Marquette Co
17 acres

Detected 2002
Thinned once? (1997)

- 20 confirmed pockets (1.2 pockets/acre)
- Average number of trees/pocket 5.7 trees/pocket
- Average new mortality per pocket 1.7 trees/pocket

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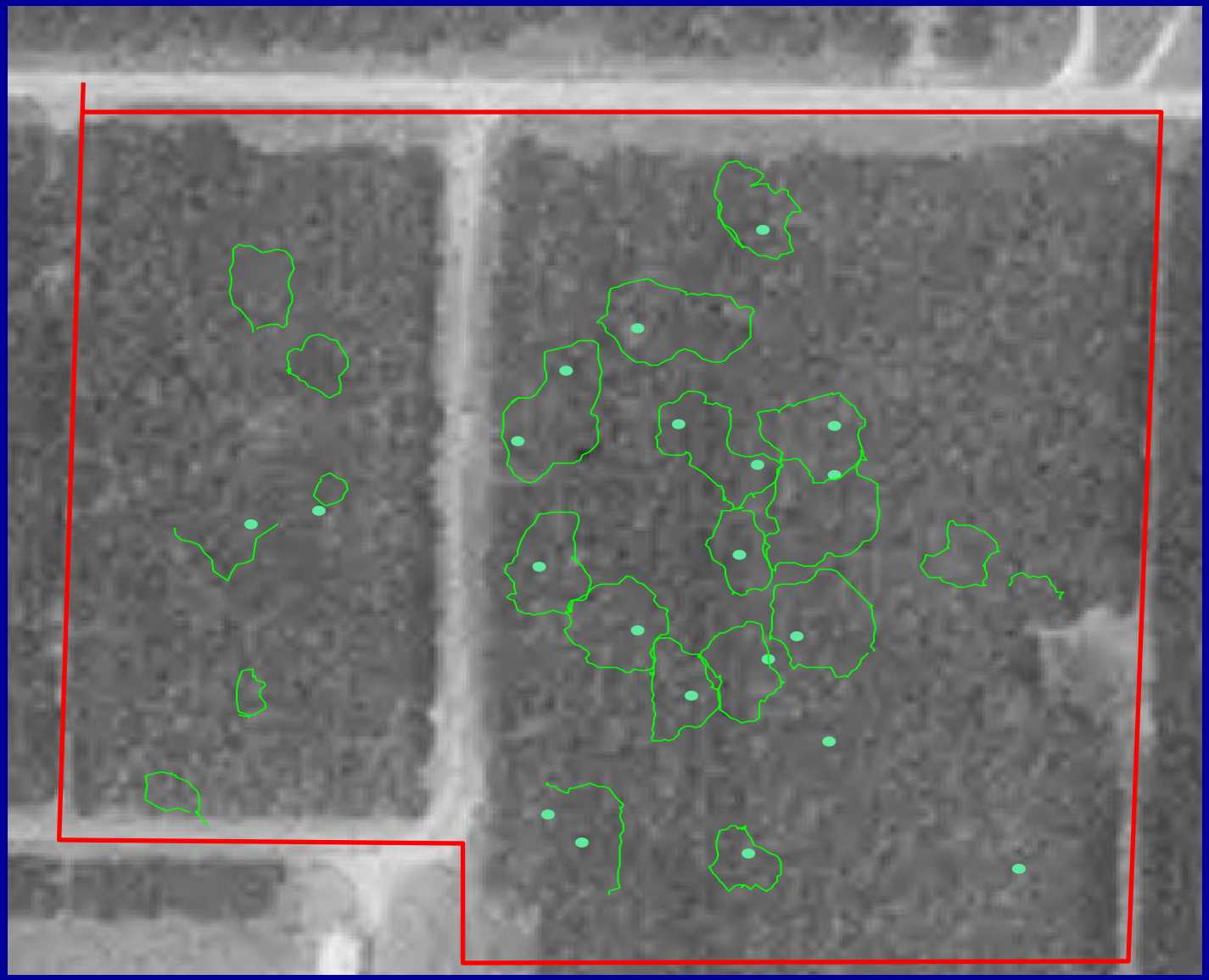
Sauk Co. forest (13 acres)



Planting trial now established on this site

Can’t we just eradicate it?

spores remain viable for decades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Dirt clods in the root balls made burning difficult and some pieces did not burn well
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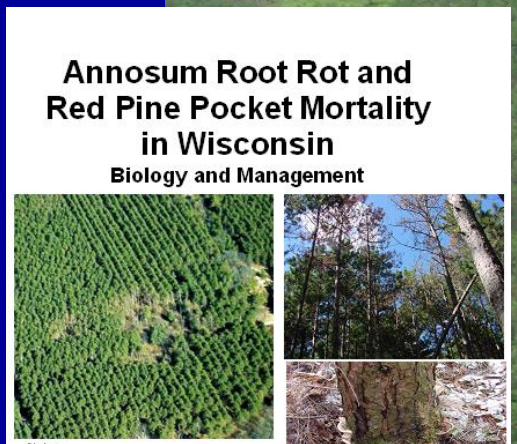
Annosum root rot committee

Representation: DNR (Private forestry, State forest, forest health), County Forest, Industry, GLTPA, WWOA, UW, Forest Service

Management of annosum root rot



One of the biggest differences in stands diagnosed with Annosum is how the stand should be harvested:

Thinning the healthy part of the stand must occur first, and stumps should be treated with a preventative; then the pocket can be harvested

Sporax treatment – powder/granular product

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Stump treatments are a preventative treatment, they will not CURE annosum once you have it

Annosum Management

- Harvest healthy part of plantation FIRST (Invasives BMP)
- Apply preventative fungicide to freshly cut stumps
- Pre-salvage ½ - 1 chain from pocket edge
- Do not move infected butt logs off property (Invasives BMP)
- Power wash equipment before leaving site (Invasives BMP)

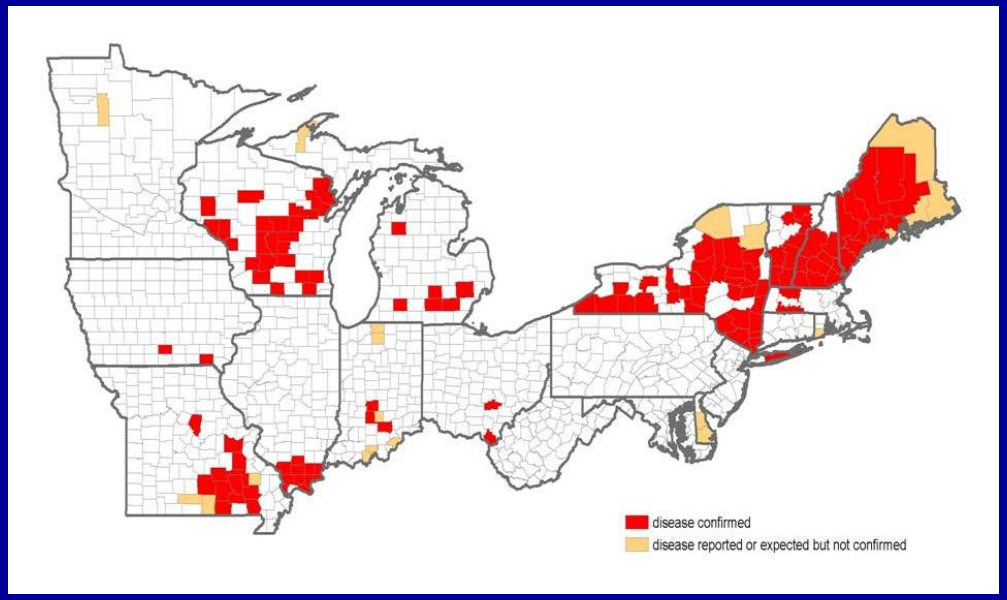
We realized we needed more

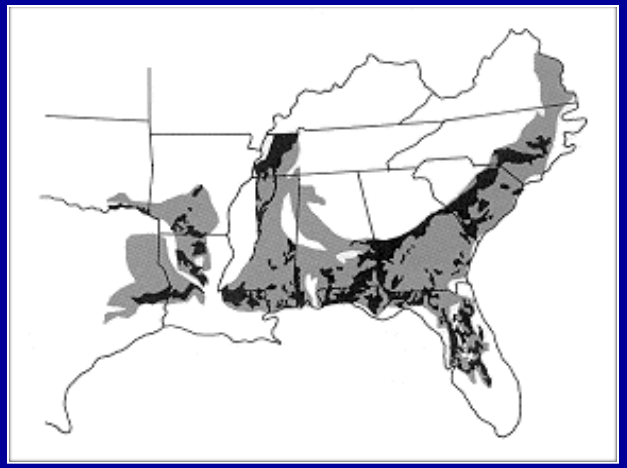
- Management wasn't "required"

- Annosum committee continued working
- Drafted a State Lands annosum policy
- Held public hearings to get more input from the logging industry

Some additional things we considered

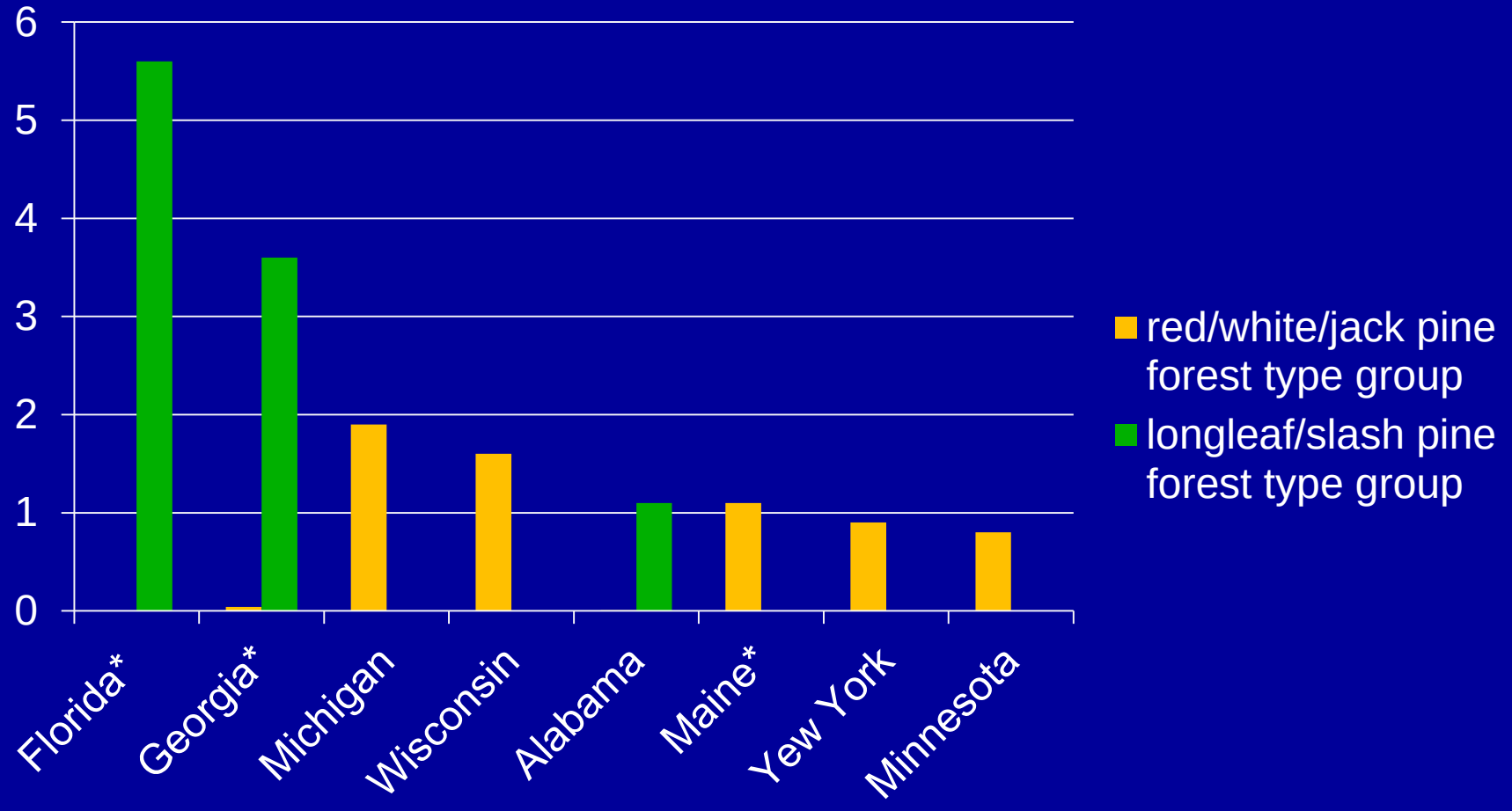
Was annosum only a problem in Wisconsin?



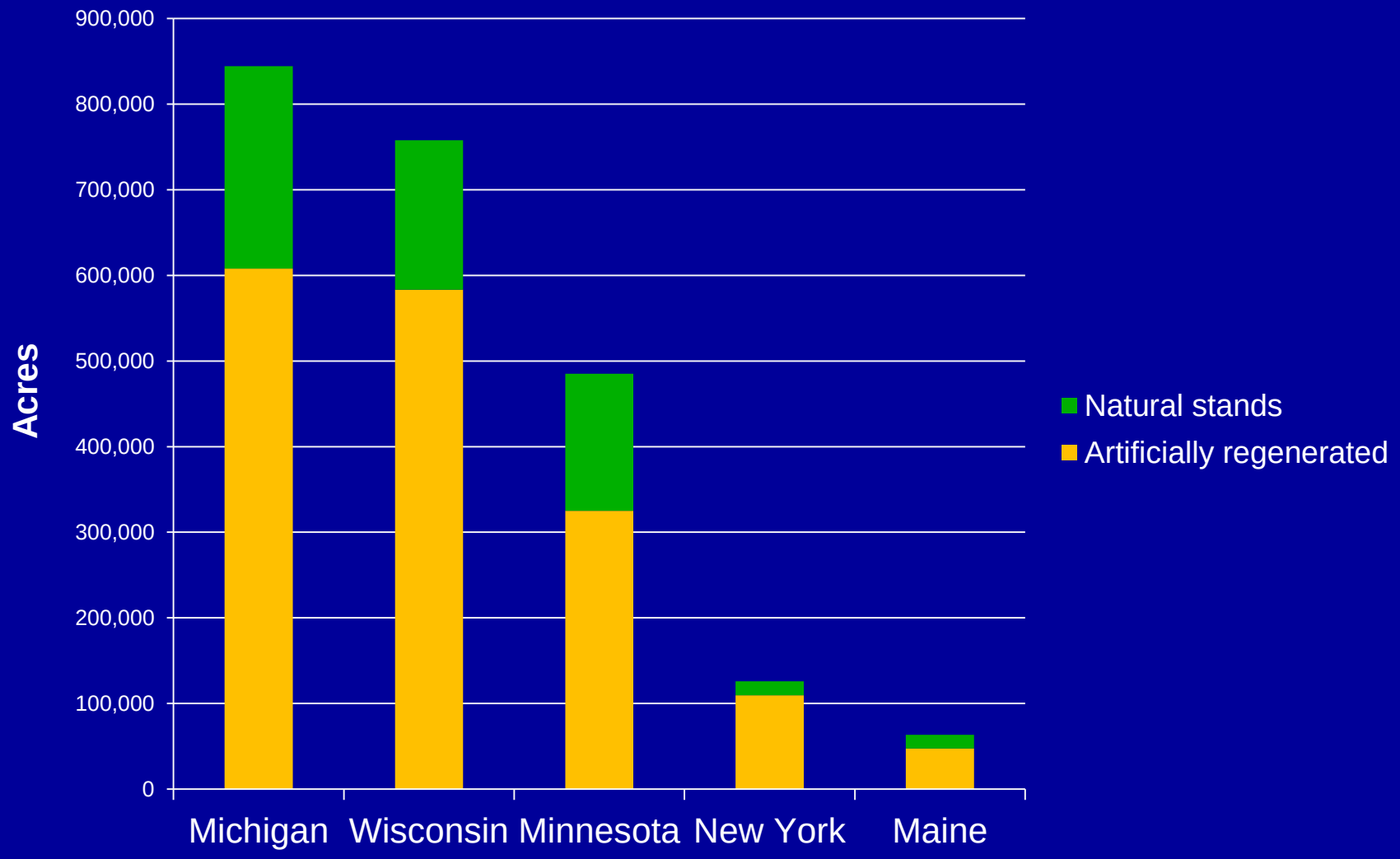


Susceptible pine resource

(red/white/jack pine forest type group & longleaf/slash pine forest type group)



Red pine resource



Cost estimate

- Treatment by manual application (per acre)

  Material cost - Sporax $4 -$9,

  Cellu-Treat $0.5-$1

  With labor ($45/hr) - Sporax $24-$34,

  Cellu-Treat $13 - $22

- Treatment by spray attachment

  $2-5 per cord

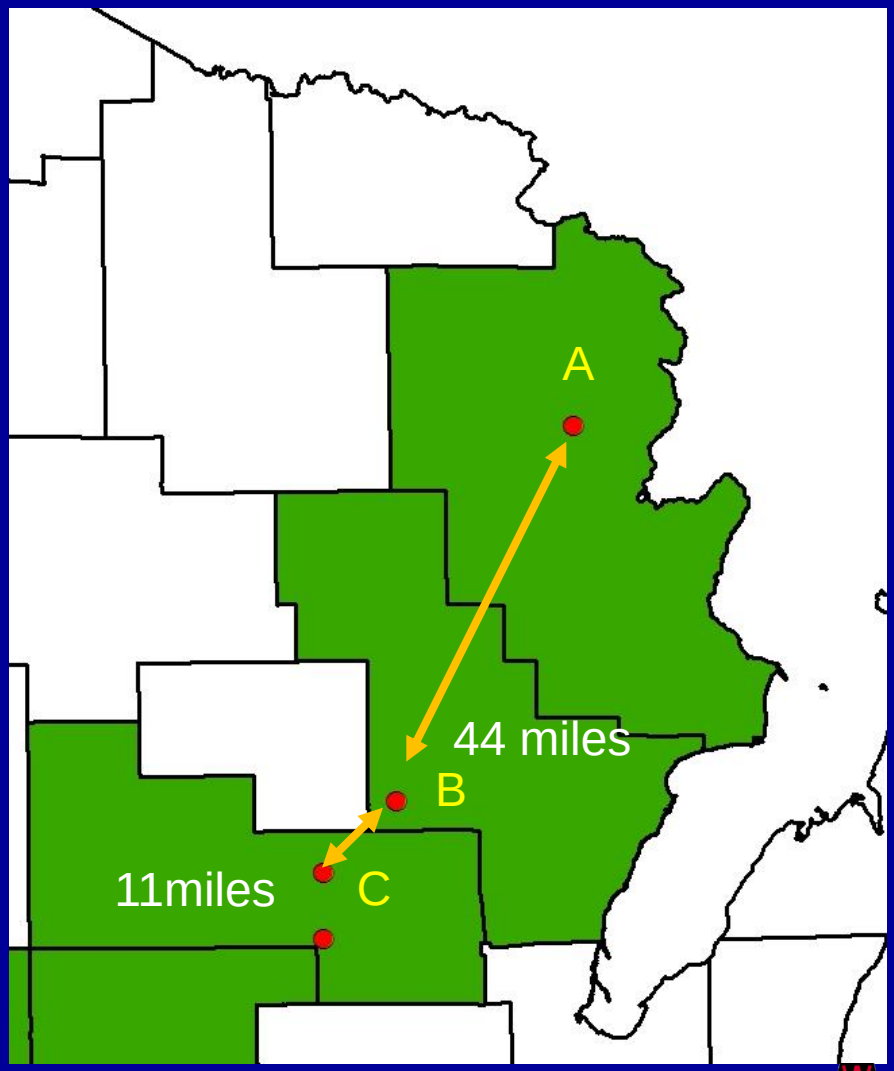
  (additional cost)

- Cost of equipment

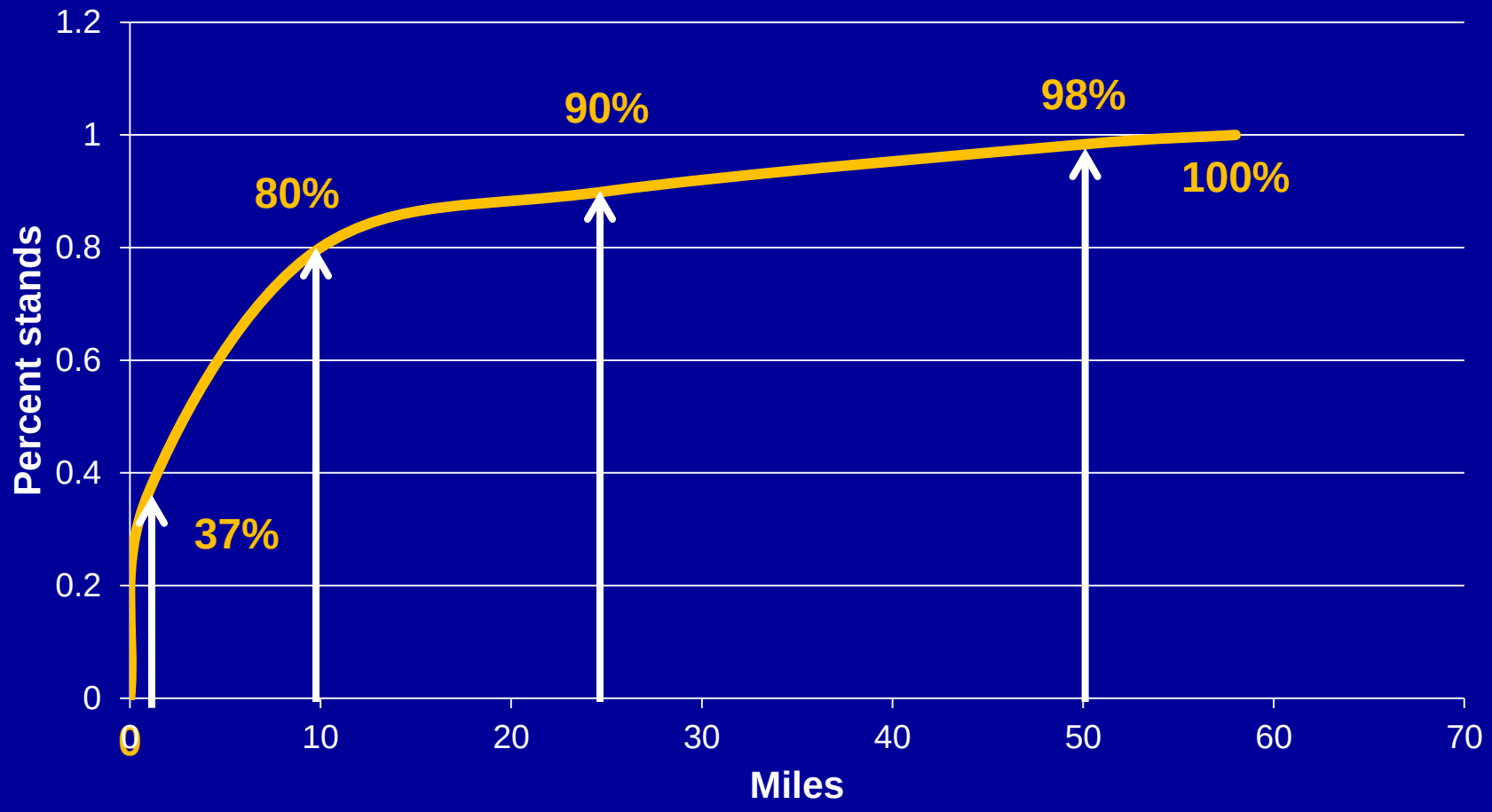
  ~ $2,000 - $12,000

Minimum distance analysis

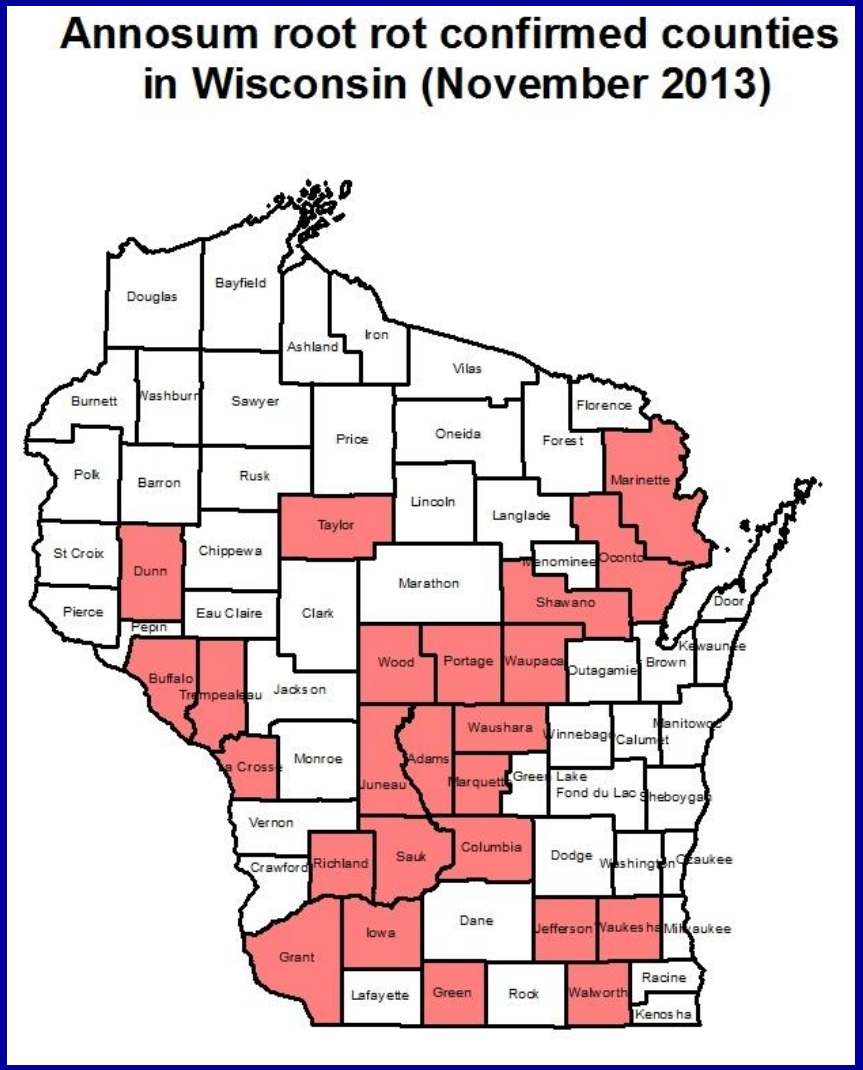
- Distance between a confirmed stand to another closest confirmed stand (n=60 stands)

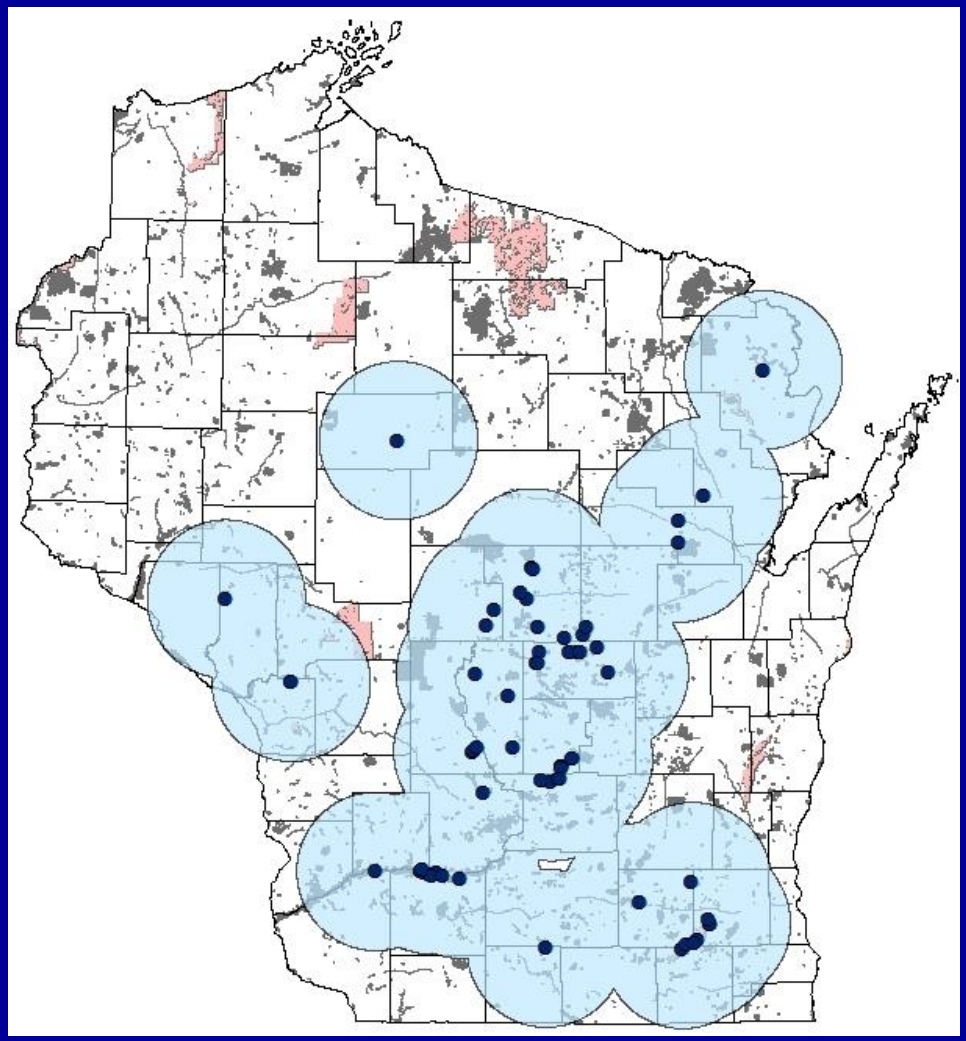


Minimum Distance between the two infected stands



Confirmed stands in WI





State Lands Annosum Policy

- Annosum must be chemically prevented on state lands if
  - Within 25 miles of known annosum infection
  - Stand is more than 50% pine
  - Cutting between April 1 – November 30
  - Final harvest
    - future stand will be over 50% pines
    - Not mechanically site prepped within a year of cutting
- One year grace period after new find outside buffer area
- Treatment <u>not</u> required December - March

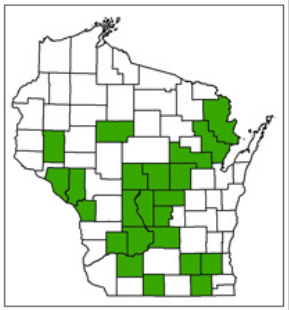
Annosum root rot

Annosum root rot, caused by the fungus *Heterobasidion irregulare*, was first found in Wisconsin in 1993. It is considered one of the most destructive diseases of conifers in the northern parts of the world. Prevention of this disease is key, as it is difficult to treat and control. Many tree species can be hosts, but in Wisconsin annosum root rot is most common on red and white pine plantations.

Distribution | Biology | Impact | Symptoms and Signs | Prevention | Management | Guide

Annosum in Wisconsin

Since 1993, annosum has been confirmed in 23 Wisconsin counties: Adams, Buffalo, Columbia, Dunn, Green, Iowa, Jefferson, Juneau, LaCrosse, Marinette, Marquette, Oconto, Portage, Richland, Sauk, Shawano, Taylor, Trempealeau, Walworth, Waukesha, Waupaca, Waushara and Wood.



Confirmed counties in Wisconsin with annosum root rot (as of April 2013)

Annosum root rot is most damaging in plantation-grown conifers (especially pines) where stumps of trees that were cut down offer a place for infection to start and connected roots provide a pathway for annosum to move from tree to tree underground.

Site factors/history

Site factors are characteristics of the specific area where a tree is growing that influence how easy it is for disease to occur there. Site factors include the type of soil, temperature, slope of the land and more that make it easy (or difficult) for disease to occur. The influence of site factors on annosum root rot has recently been studied in Wisconsin and data analysis is in progress.

In the southeastern United States, the disease is more common on former agriculture land with a soil pH of less than 6 than on old forest soils. Sandy or sandy loam soils at least 12 inches (30 cm) deep, with good internal drainage and a low seasonal water table are also considered sites favorable for disease development.

Forest health

Read
what's new in our current regional forest health updates.

Watch
how to identify and control invasive forest plants.

Learn
about gypsy moth and other spring leaf-eating caterpillars.

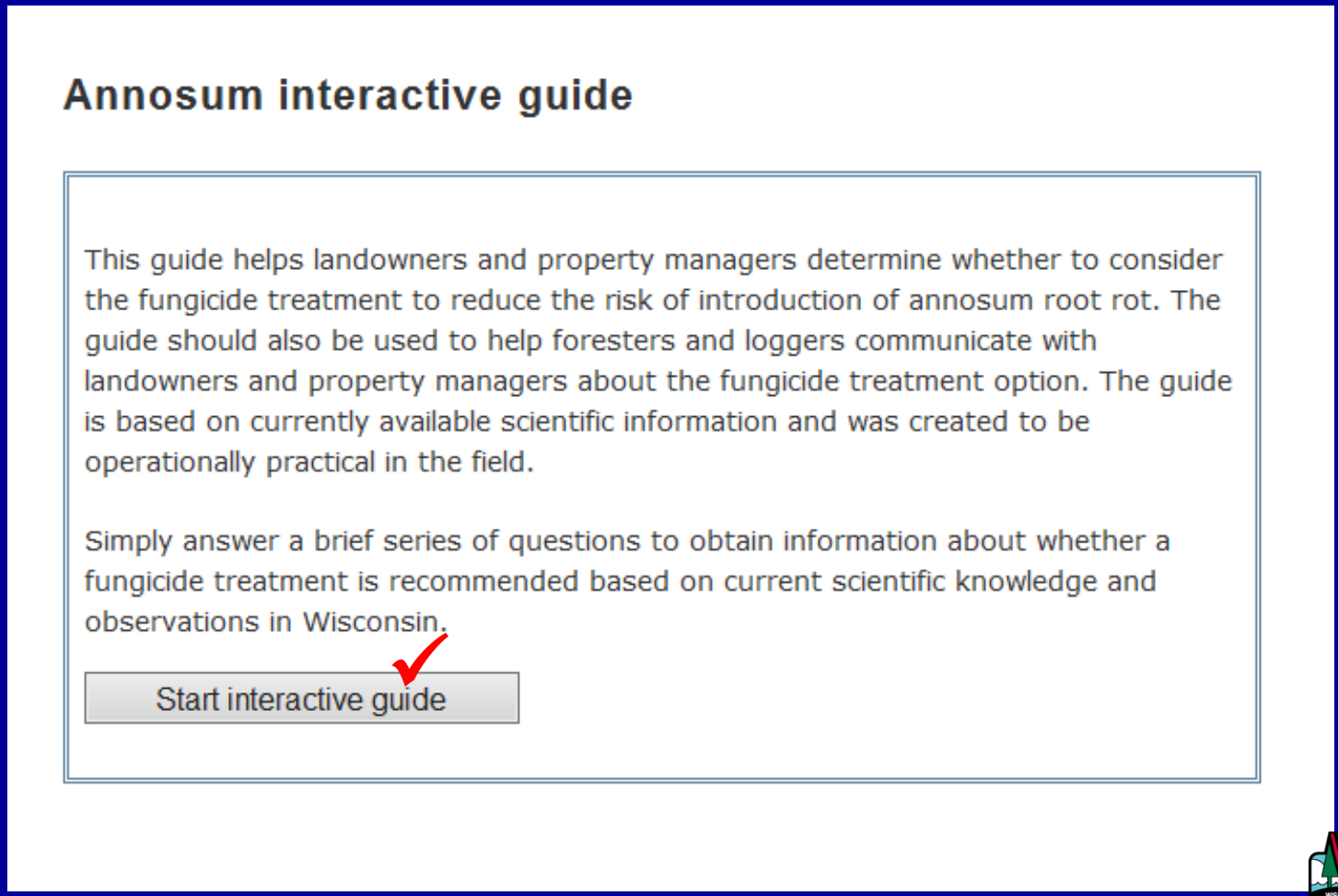
Annosum root rot guides
- Annosum root rot web page
- Interactive guide
- Annosum treatment guide [PDF]
- 25-mile buffer map [PDF]

Related links
- Annosum root rot factsheet [PDF]
- Annosum root rot economic analysis: 2008 annual report [PDF]
- Annosum root rot and red pine pocket mortality in Wisconsin [PDF]

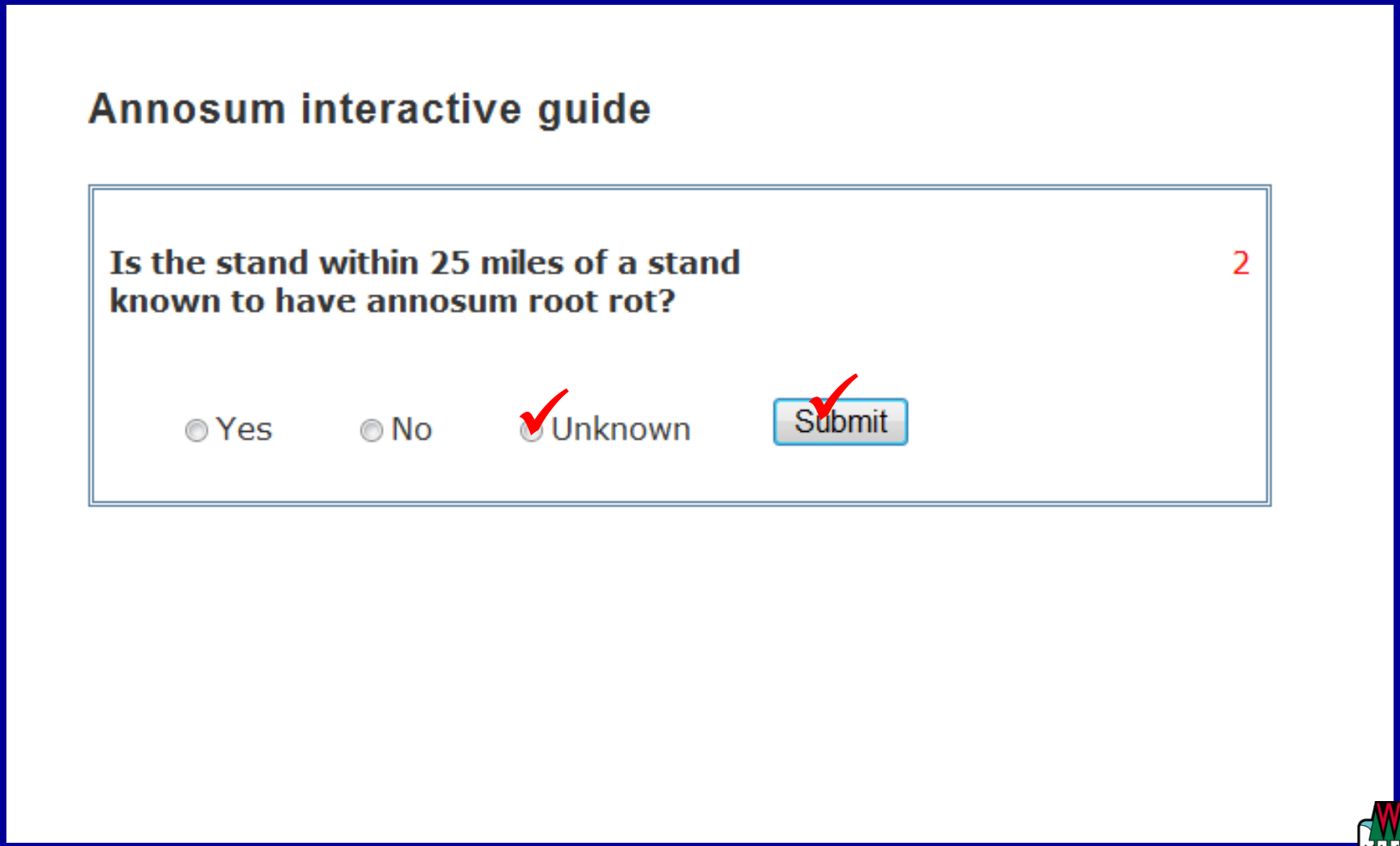
Diseases
- Annosum root rot

Annosum on-line interactive guide

http://dnr.wi.gov/topic/ForestHealth/AnnosumRootRot.html



Annosum interactive guide



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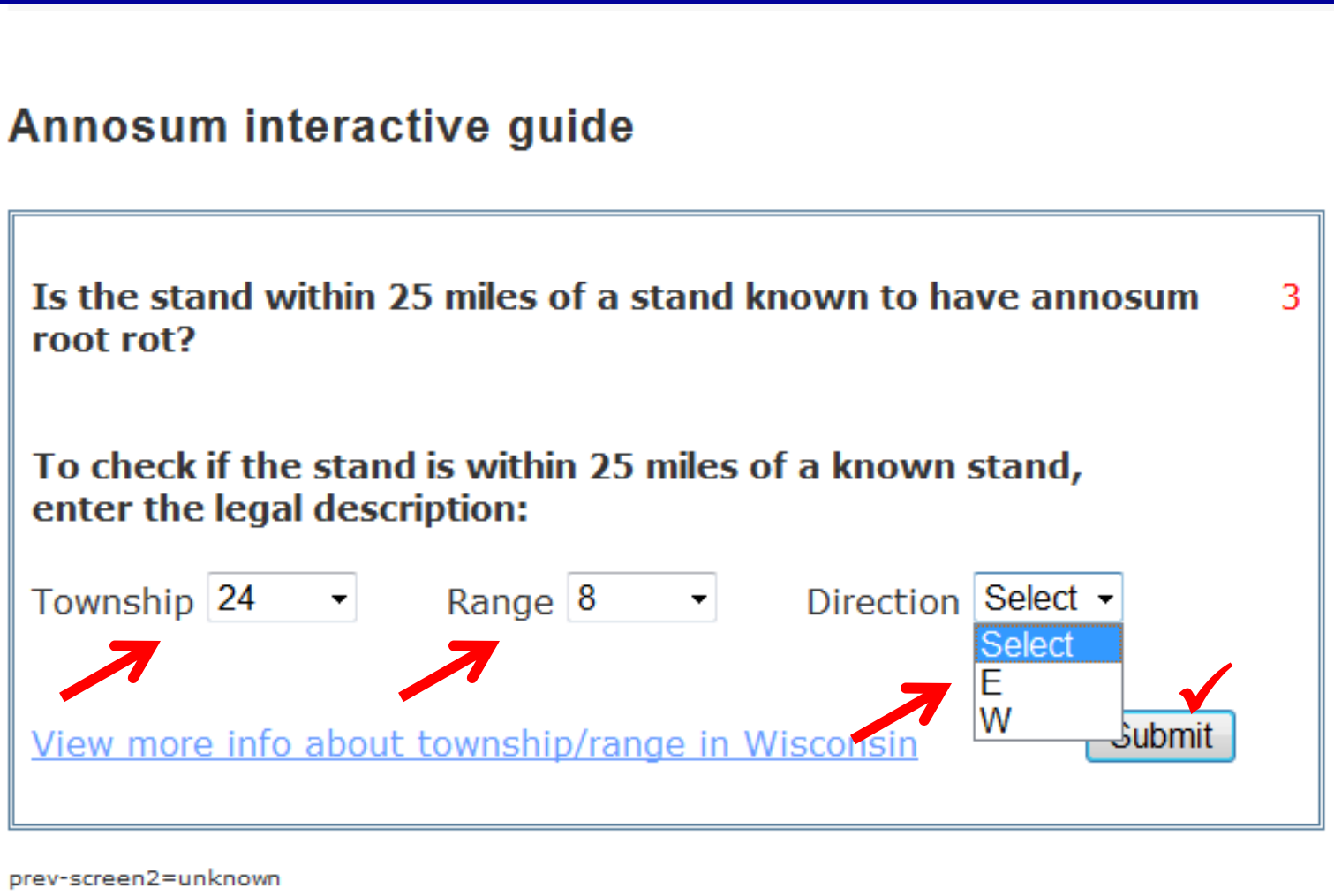

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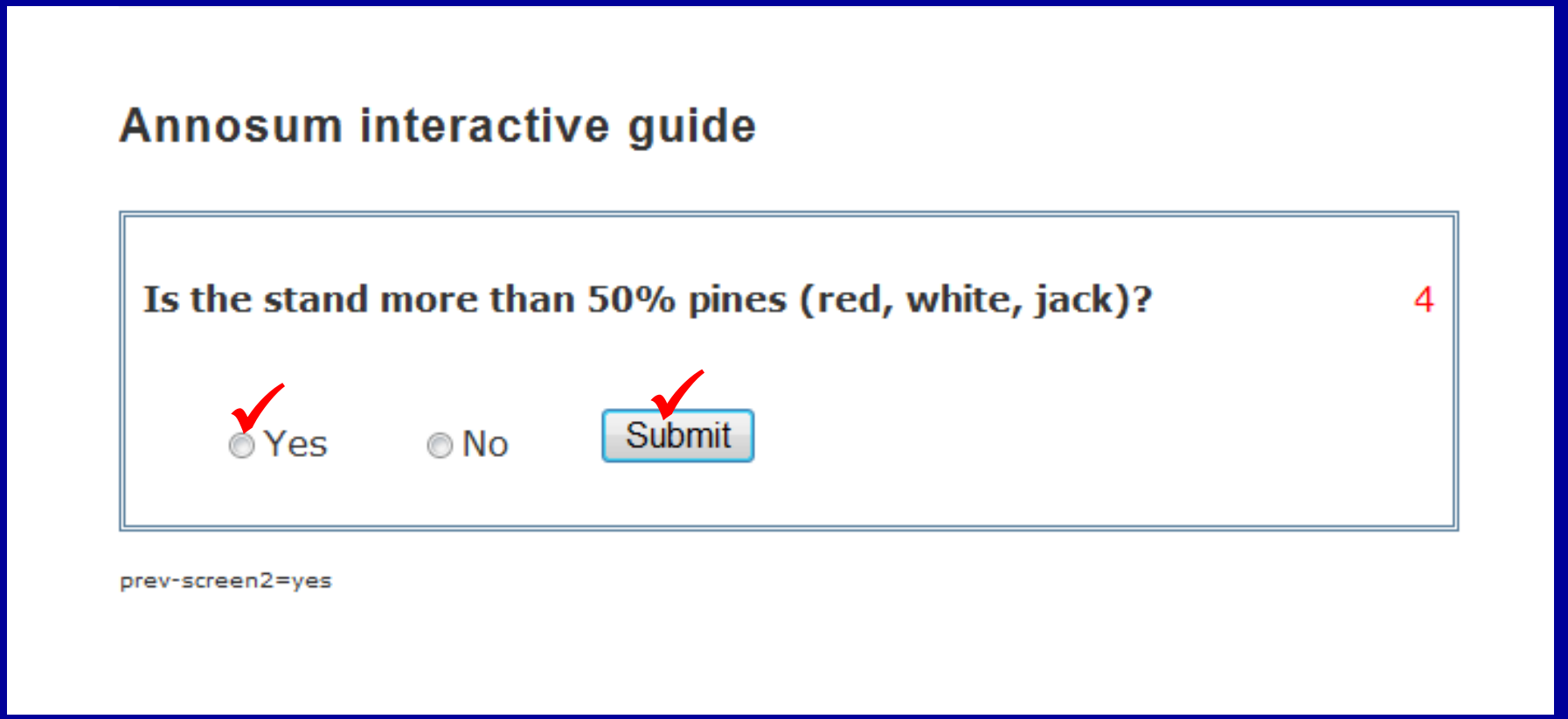
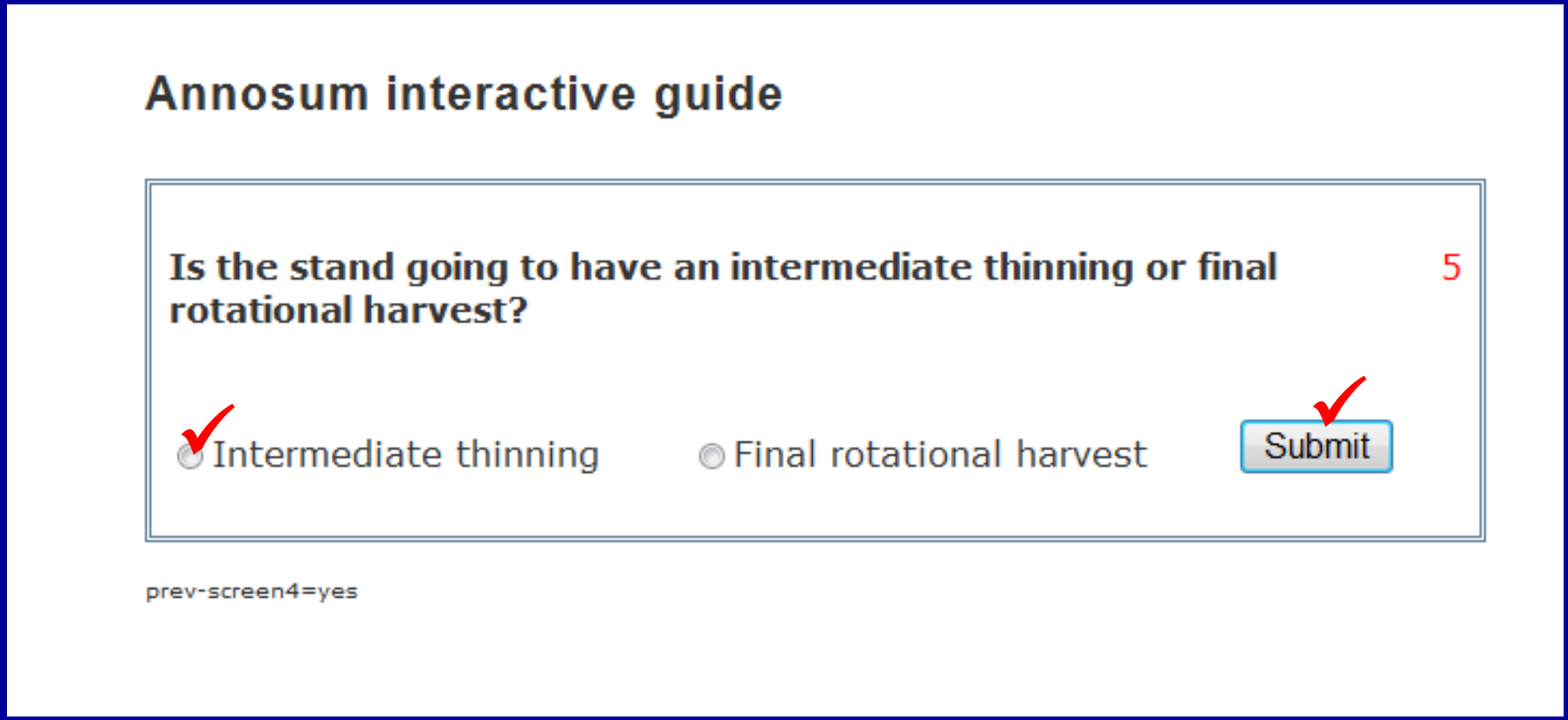


Annosum interactive guide



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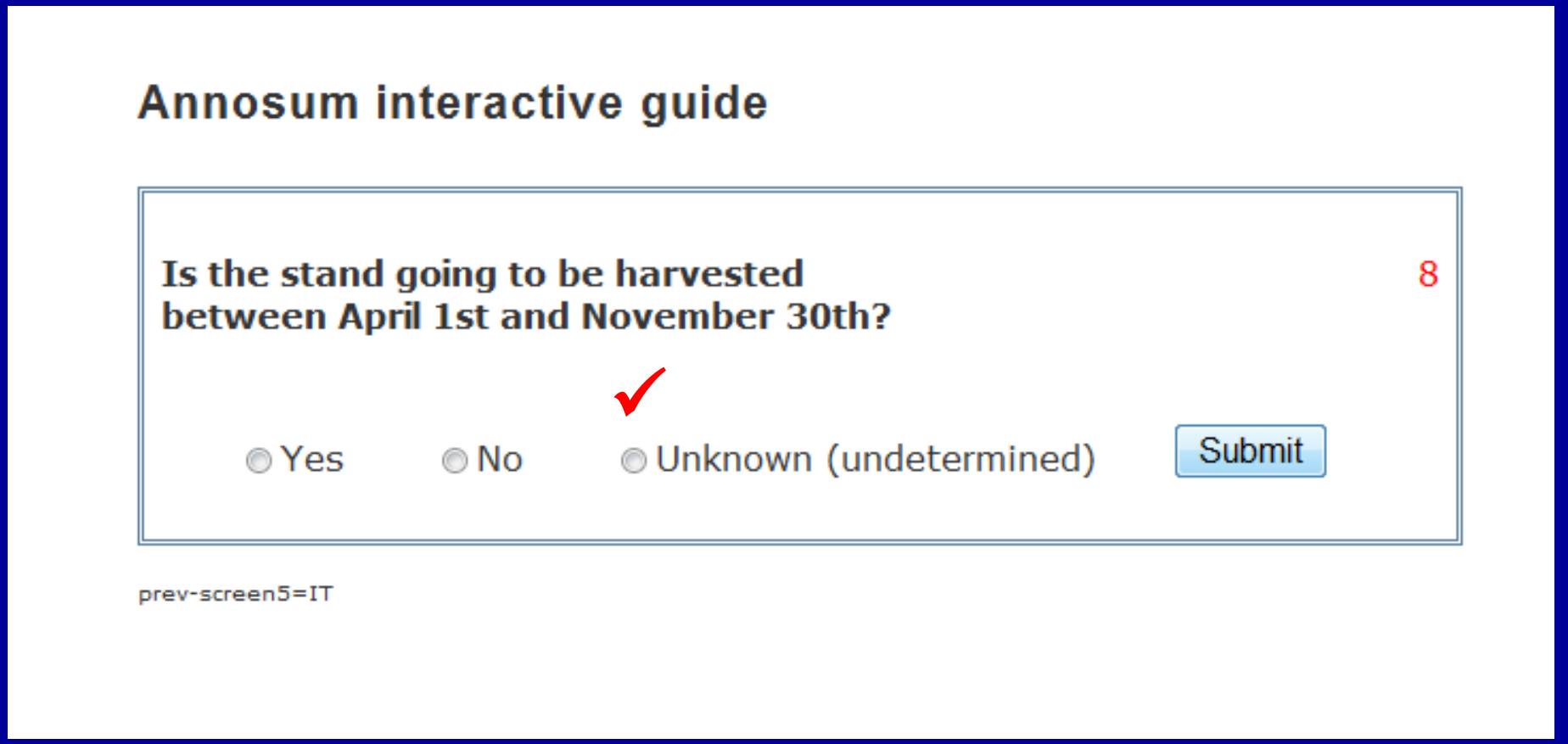

Annosum interactive guide recommendation

Annosum interactive guide

Recommendation

Treatment is recommended from April 1 to November 30 except under unusual weather patterns. Examples of unusual weather conditions include but are not limited to:

- prolonged, unusually warm weather during the winter period (Dec 1- Mar 31); and
- heavy snow cover outside of the winter period.

On state lands, in case of unusual weather conditions, the property manager will have the discretion to deviate from the guide if conditions warrant. Property managers should fill out and sign the form [PDF] if a deviation is to be granted on a particular timber sale.

Paper version is also available

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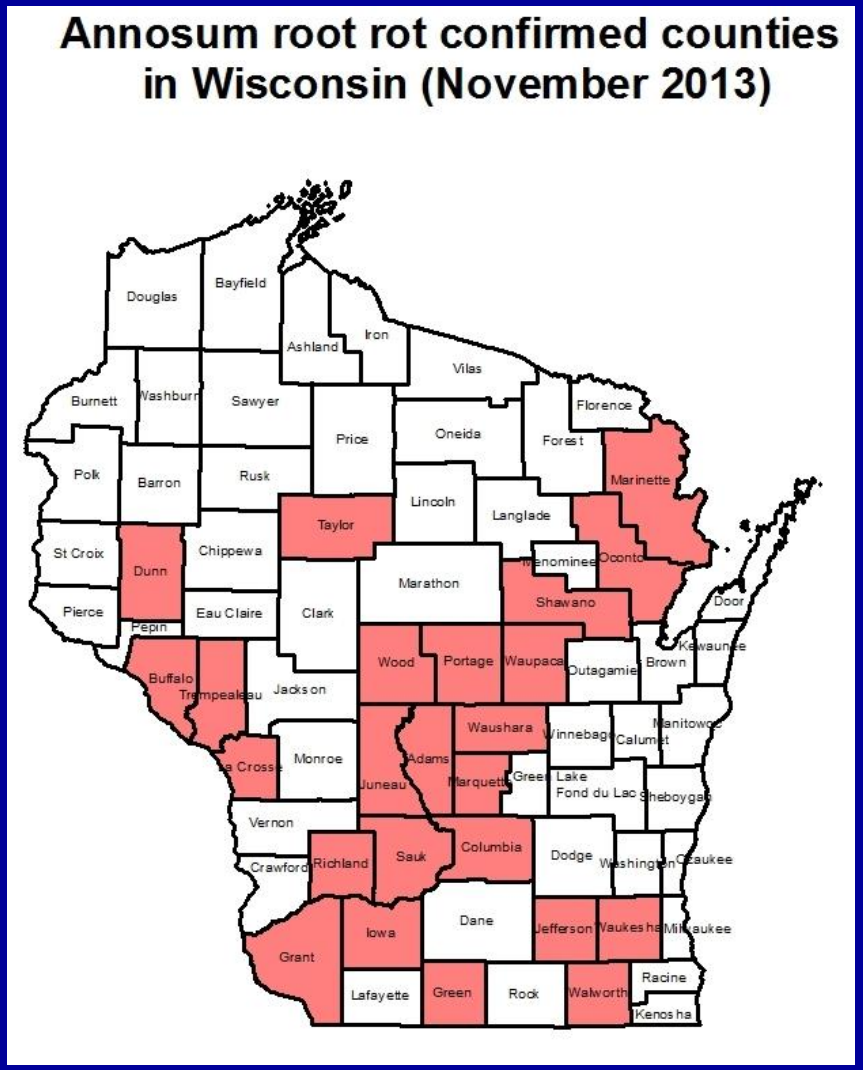
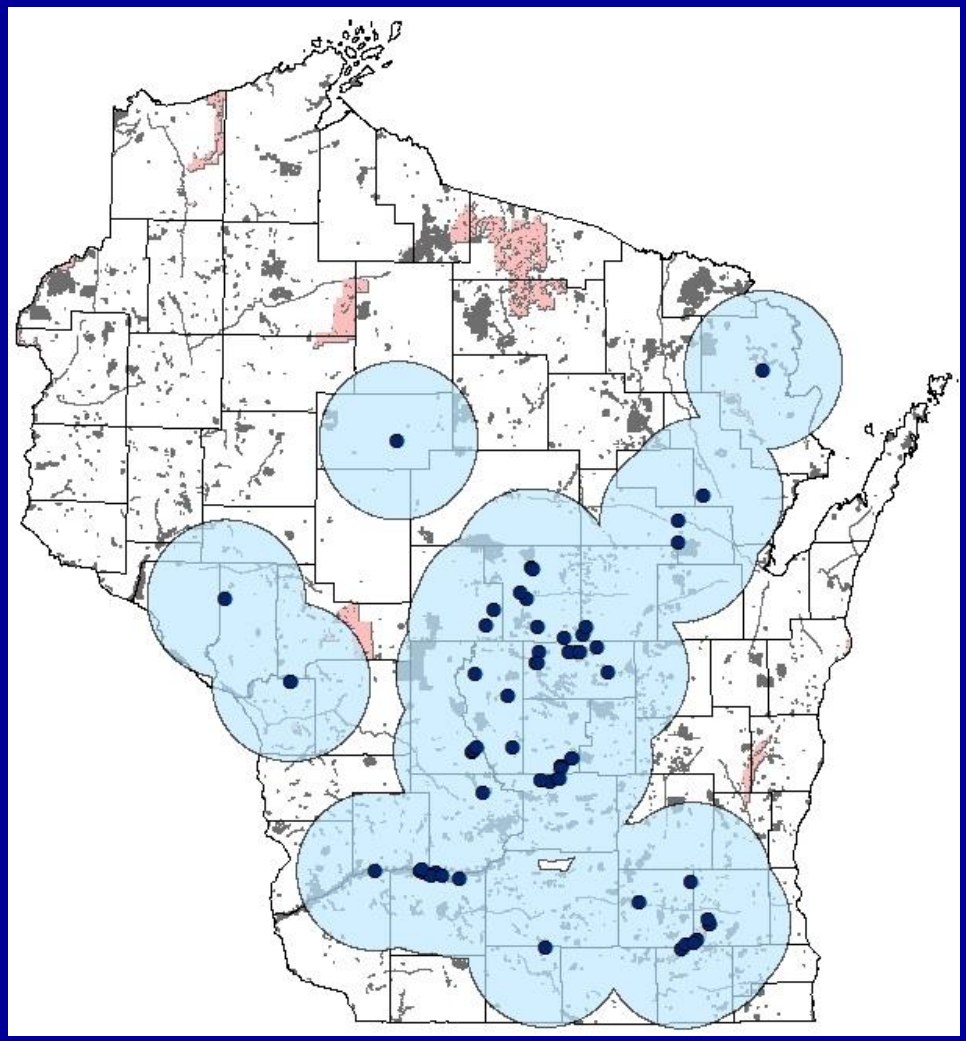
Confirmed stands in WI





Basic understanding behind the guide

- The guide was developed based on the best available information and knowledge
- Continue to support further research
- Continue detection surveys and monitoring
- The prescriptions will be adjusted as more information becomes available (the committee plans to review the guide in 2015

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Questions?