Diagnosing Tree Disorders in Maine

Aaron Bergdahl, Forest Pathologist, Maine Forest Service

maine DEPARTMENT OF Agriculture Conservation & Forestry

Why are diagnostic skills so important?

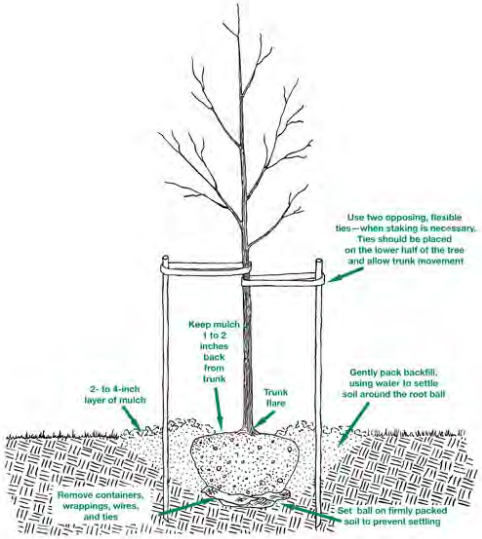
(Trees Cannot Talk)

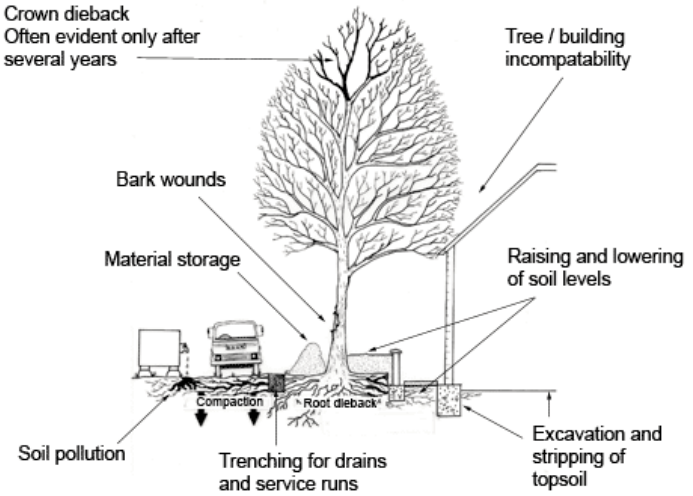
“We feel GREAT!”

“I don’t feel so good,
I think it’s my roots...”

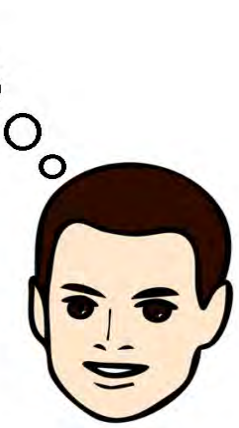
Why are diagnostic skills so important?

(Incomplete information)





Your tree's problem may be you...



Gathering information: Asking Questions

- Where was the tree purchased?
- When was the tree purchased?
- When did you plant the tree?
- Describe how the tree was planted?
- When did you first notice symptoms?
- What did the first symptoms look like?
- Have the symptoms gotten worse?
- Questions about unusual weather?
- Etc…

Gathering information: Observations

- **Be thorough**
- **Be systematic**
- **Use all of your senses**
  - **Feel things, poke around**
  - **See things, notice abnormal color**
  - **Smell things, odd smells**

Gathering information: Observations

- **Be thorough**
- **Be systematic**
- **Use all of your senses**
  - **Feel things, poke around**
  - **See things, notice abnormal color**
  - **Smell things, notice odd smells**
  - **Don't taste things**
    - **Not much to be learned from this**
    - **Tree owner will think you are strange**

Diagnosis: The Approach

4 Basic Categories of Observation

1) Plant Identification

2) Site Inspection/Site History

3)Assess the Pattern of Abnormality

4) Inspection of the Functional

Parts of the Tree (leaves, branches, roots and collar)

1) Species Identification

- **Most insects and diseases are specific to the host trees they attack.**

- **Proper identification of species (+ subspecies or variety/cultivar) quickly narrows down the number of possible causes**.

- **Insect and disease issues are often regionally specific.**

- **Host identification is the key!**

There are 100s of tree diseases in the U.S.




For a particular tree species, there may be about 15 known diseases



Within a given geographical area, there may be only 2 or 3 diseases that are common for that species

2)Site Inspection

- ‘Site’ broadly describes all of the conditions in the local area where the tree is grown
- Tree Health and Vigor are often determined by site factors

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2)Site Inspection

Site Factors Include:

-Soil Type

-Climate

-Microclimate

-Landform

-Moisture conditions

-Disturbance History

-How does the lawn look (herbicides)?

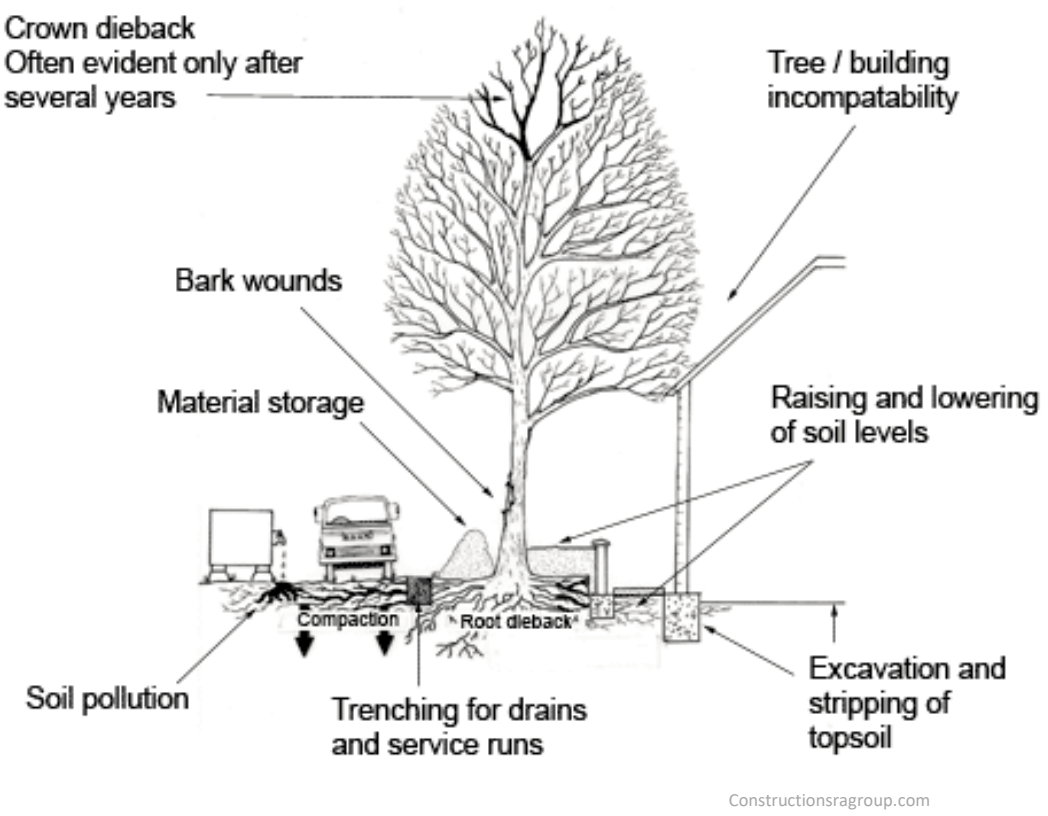
2) Site Inspection

In addition, many ‘Site’ problems may include physical or chemical injuries.

2) Site Inspection/History

Many Tree Problems of Urban/Residential Sites Include:

- Recent Excavation
- Construction: Road, Sidewalk, new internet cable, etc.
- Chemical Use/storage
- Soil Compaction
- Mechanical Injuries



3) Assess the Pattern of Abnormality

- Damage Caused by Environmental and Abiotic Factors
  - Tend to be expressed throughout the entire tree
  - Tend to be expressed
    - in more than one tree
    - more than one species

Abiotic


Abiotic
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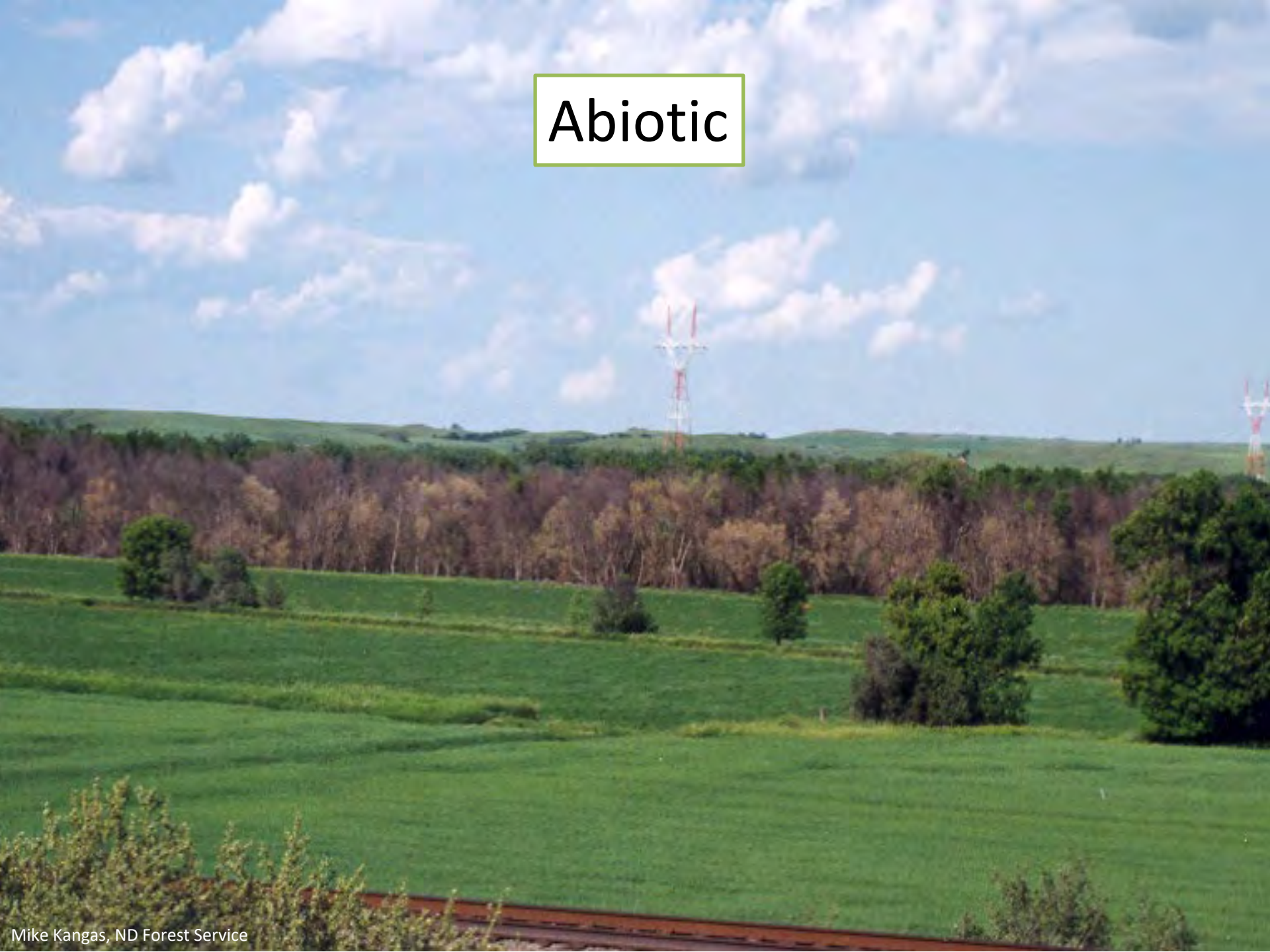

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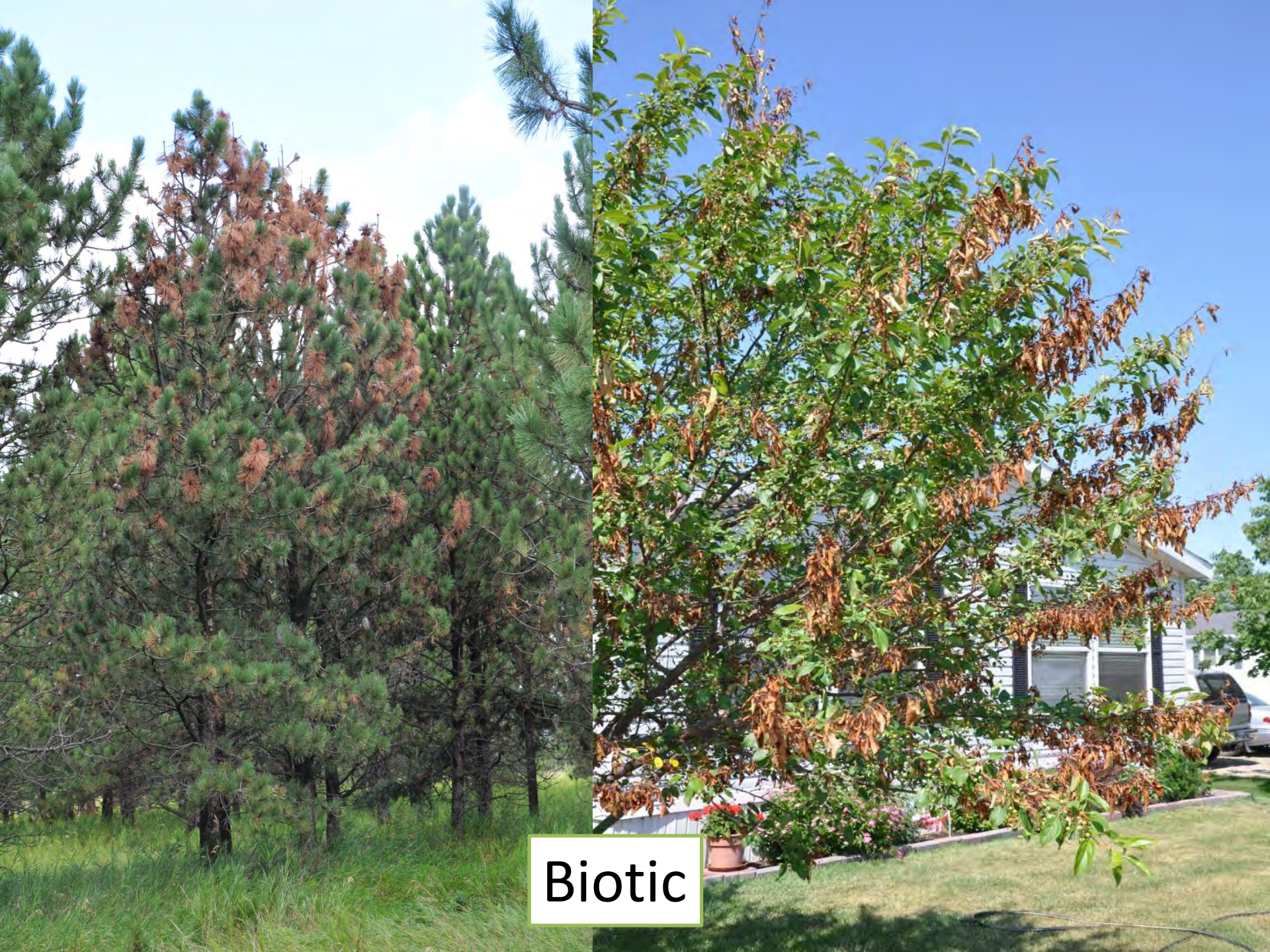
Abiotic


LINCARE

3)Assess the Pattern of Abnormality

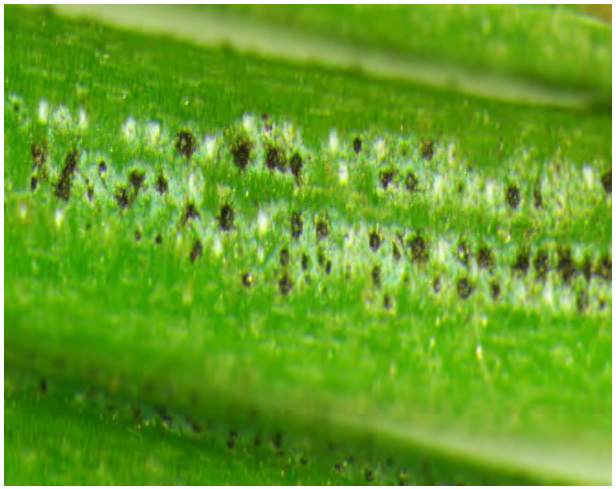
- Damage Caused By Insect and Pathogen Pests
    - Tends to have a more sporadic, *here and there*, pattern
    - Insects and pathogens are specialists, have a narrow host range and damage is restricted to one or a few closely related species → and specific tree parts/tissues

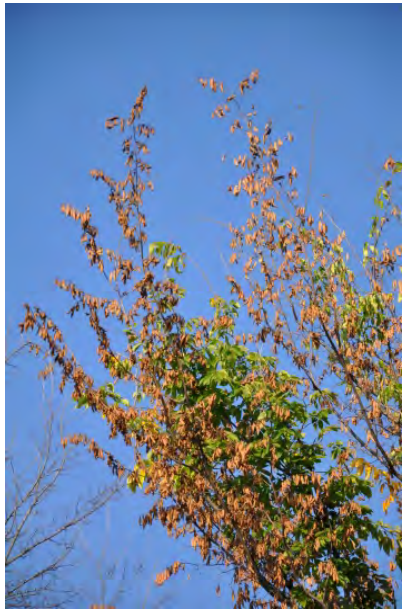
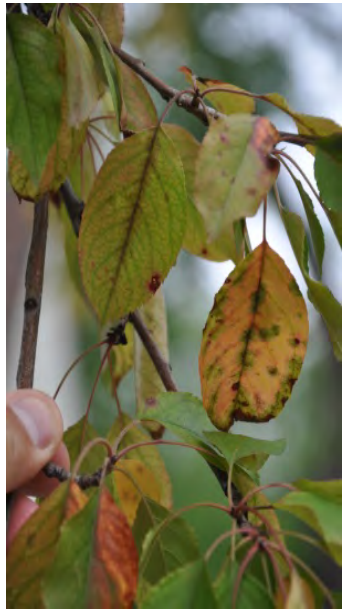

Biotic

Biotic

4) Inspection of the Functional Parts of the Tree

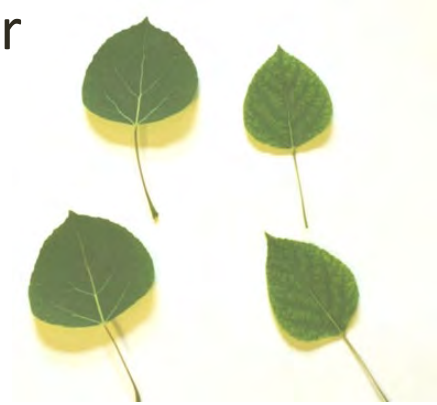
Leaves/Needles

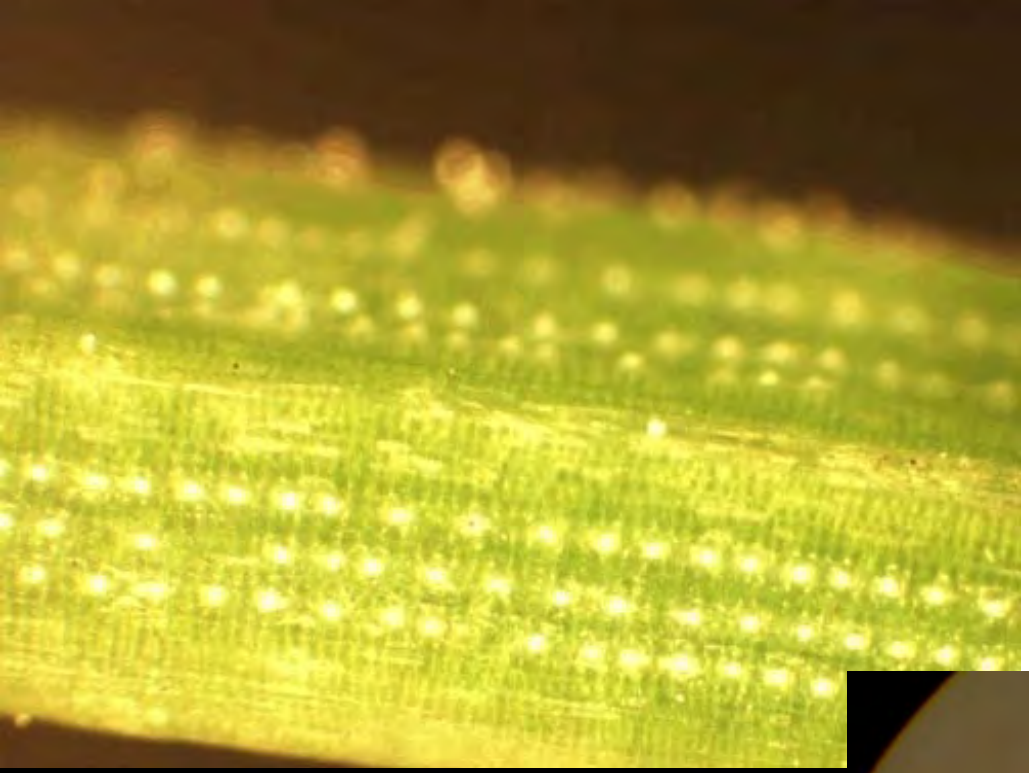





Foliage

Do the Leaves Appear
Chlorotic?
Wilted?
Curled?
Small?



Growths or spots on the needles?



Jim Walla Northern Tree specialties

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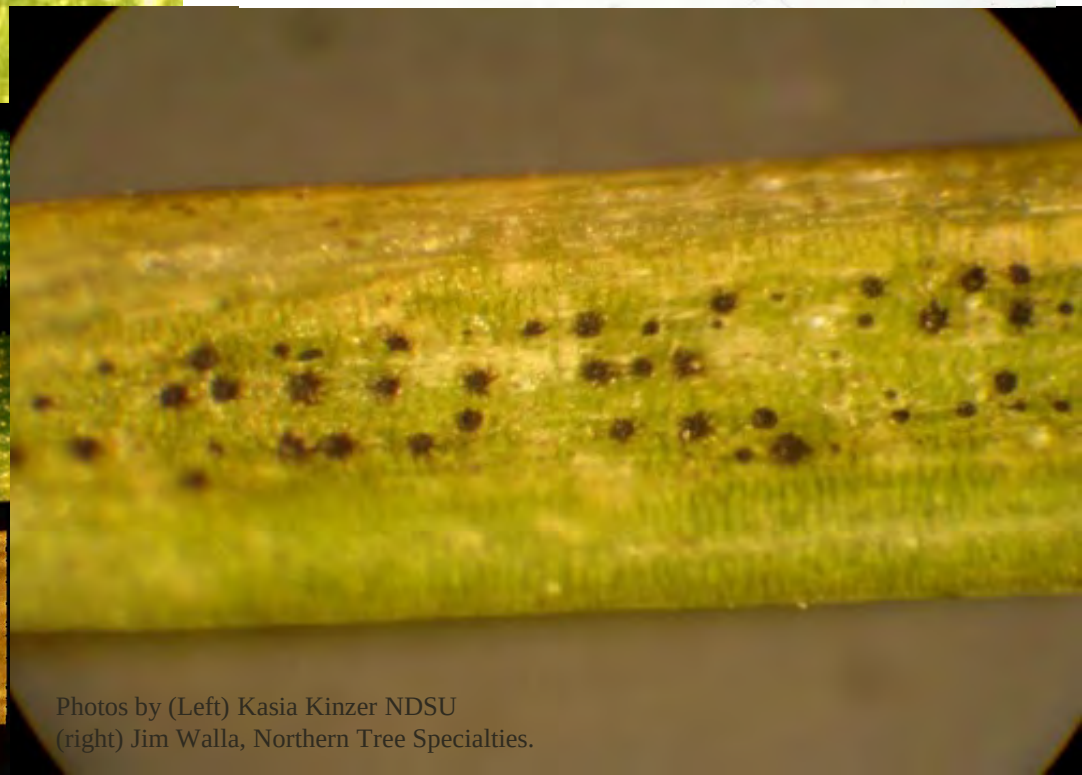
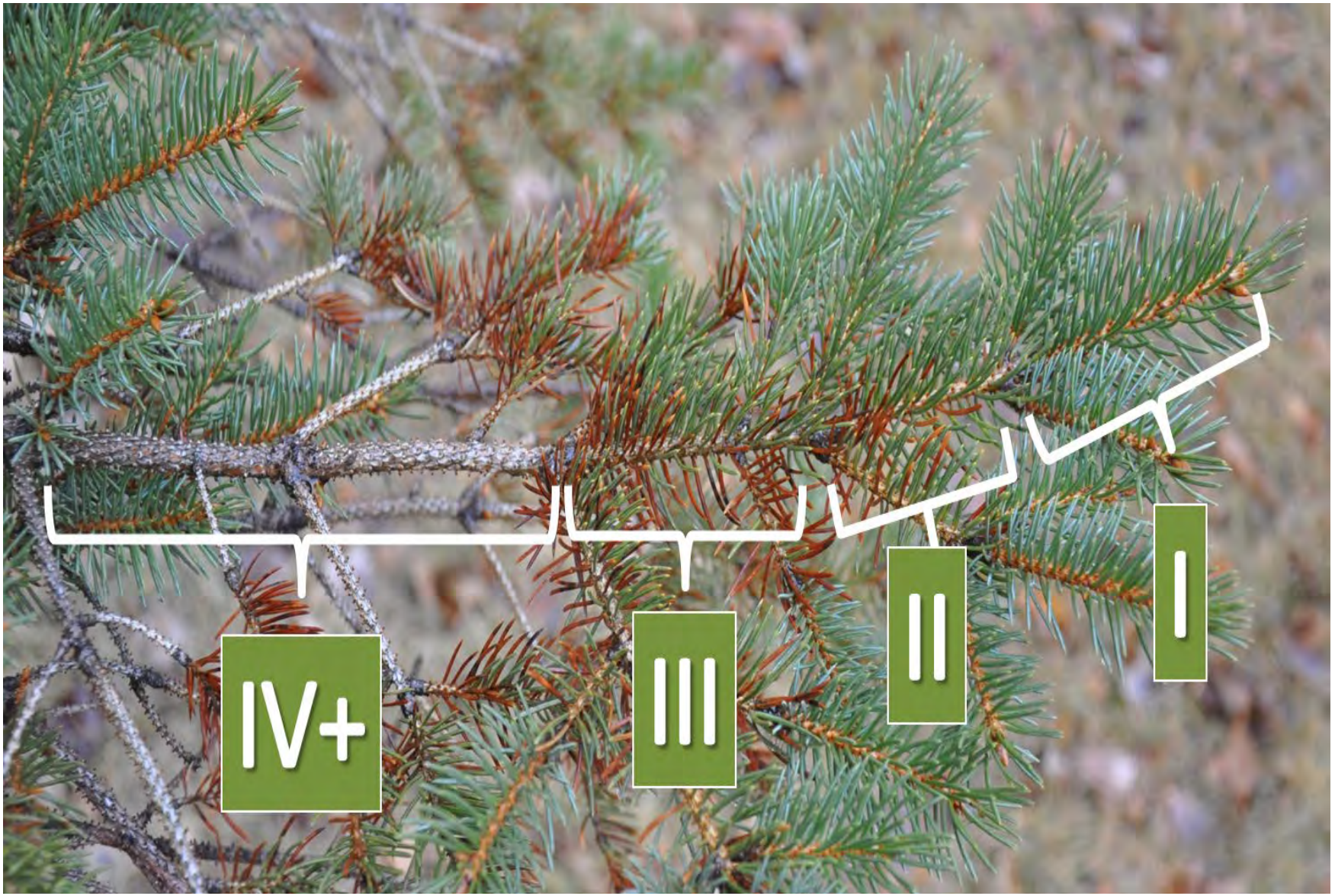


Photos by (Left) Kasia Kinzer NDSU
(right) Jim Walla, Northern Tree Specialties.

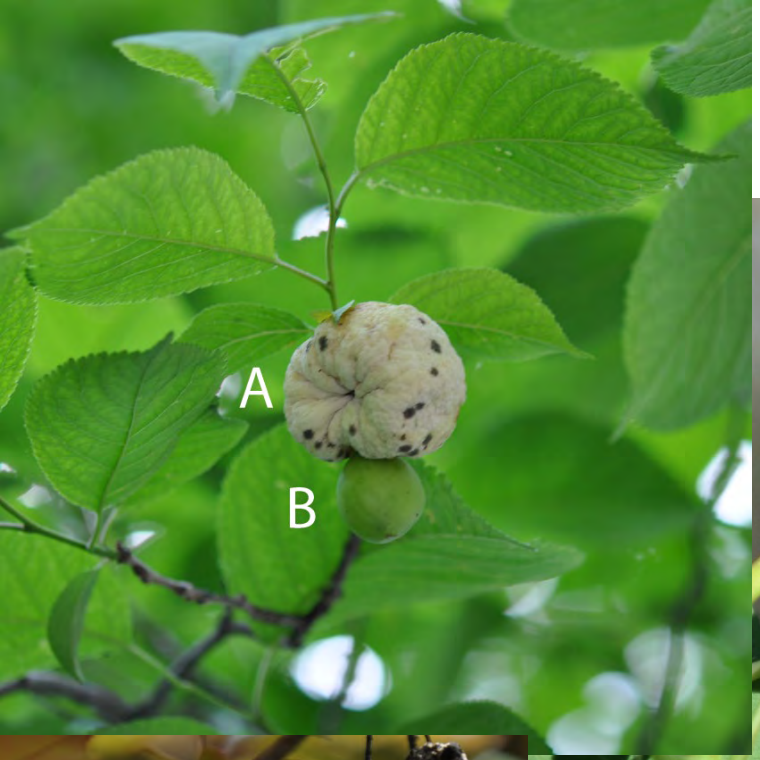
Is there reduced needle retention?



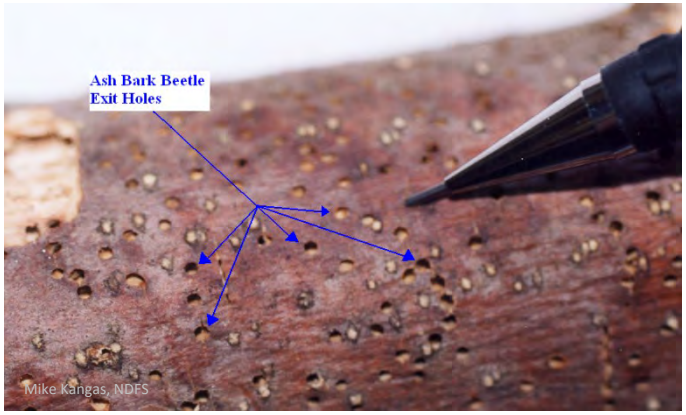
Leaf spots or lesions?

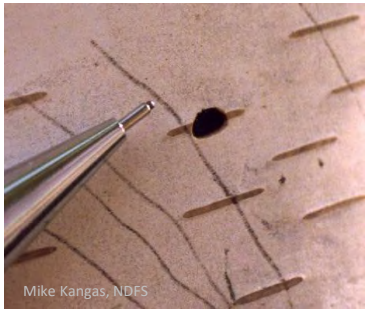

Insects?

Abnormal Fruit?



4) Inspection of the Functional Parts of the Tree Branches/Shoots

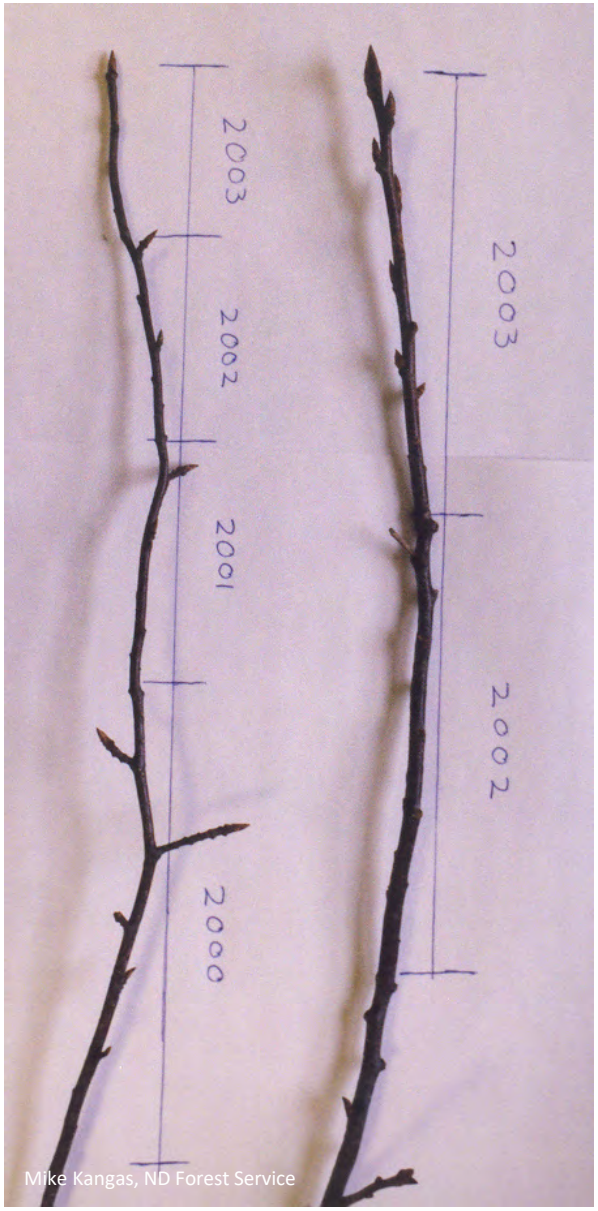




Wounds? Cankers? Insect Exit Holes?

Flagging

Shoot Growth of Recent Years?



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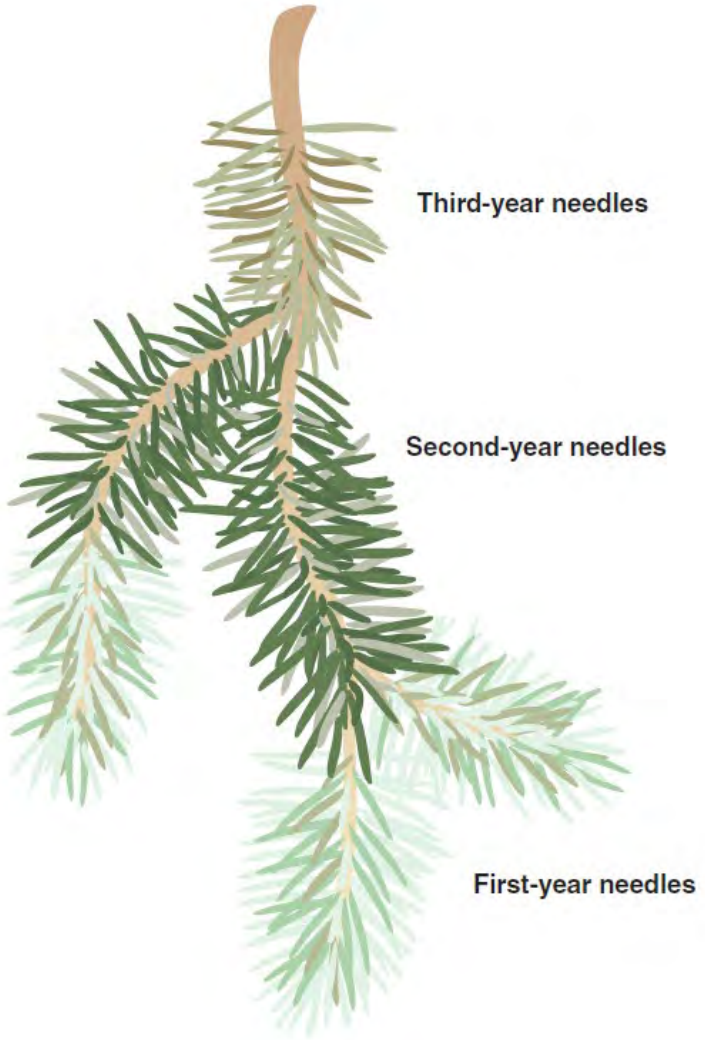

Dave Haasser, NDSU

Shoots

When did the shoots die?

4) Inspection of the Functional Parts of the Tree Main Stem/Roots/Root Collar







Wounds? Cankers? Insect Exit Holes? Rot/Decay? Girdling Roots?

Cankers

Root Damage

Notice Symptoms, Find and Note Signs

Symptoms

- What is not ‘normal’?

- Note location of symptoms, trace back to signs.

Notice Symptoms, Find and Note Signs

Signs

- Types of insects (body shape, where feeding, color, patterns, etc.)
- Types of fungal growths, anything that looks unusual (compare to health trees).

Locate Useful (reputable) Resources

Books

Field Guides

Websites

People

QUIZ TIME

Identify Species

Site Inspection

Assess Pattern of Abnormality

Observe Functional Parts

M. Kangas, NDFS

What's wrong with this tree?

What is the first step?

M. Kangas, NDFS

Red pine…

Normal for this species?

Symptoms are expressed throughout the entire Tree?

- Site inspection

- Examine functional parts of the tree

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M. Kangas, NDFS

(The Sign, Lawn Mower Blight)

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What’s wrong with these trees?

What is the first step?


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What species are affected?

Multiple Species Showing Similar Symptoms?

Uniform?

Is this normal?

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Site inspection…

Ask questions about site history...

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Road Salt Pile

What’s wrong with this shrub?

What is the first step?

What species?

Is this normal?

What’s wrong with these tree?

What is the first step?

What species is affected?

Are symptoms expressed throughout the entire Tree? Sporadic?

Assess functional parts of the tree...

Symptoms

+

Signs

= Diagnosis

Symptoms

+

Signs

= Diplodia shoot blight

What’s wrong with this tree?

What is the first step?

Symptoms

+

Signs

= Diagnosis

Pear Slug Sawfly

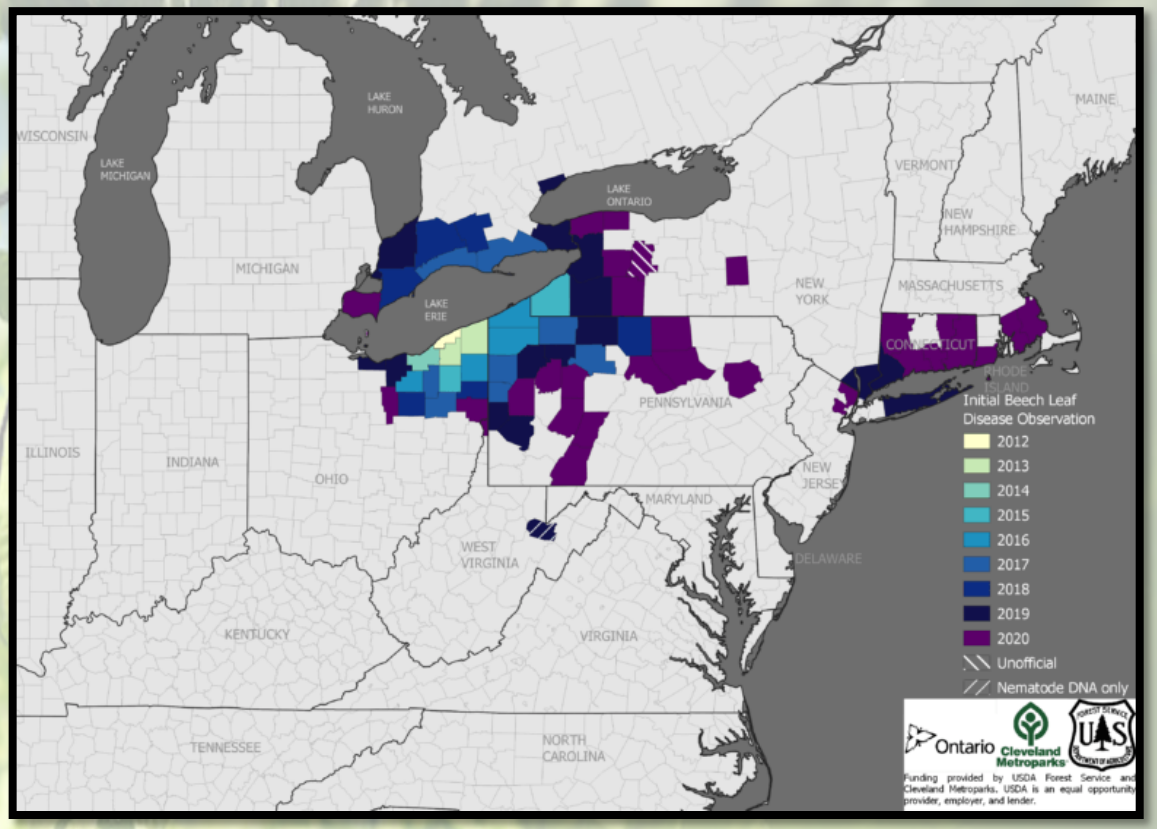
Questions?

Beech Leaf Disease

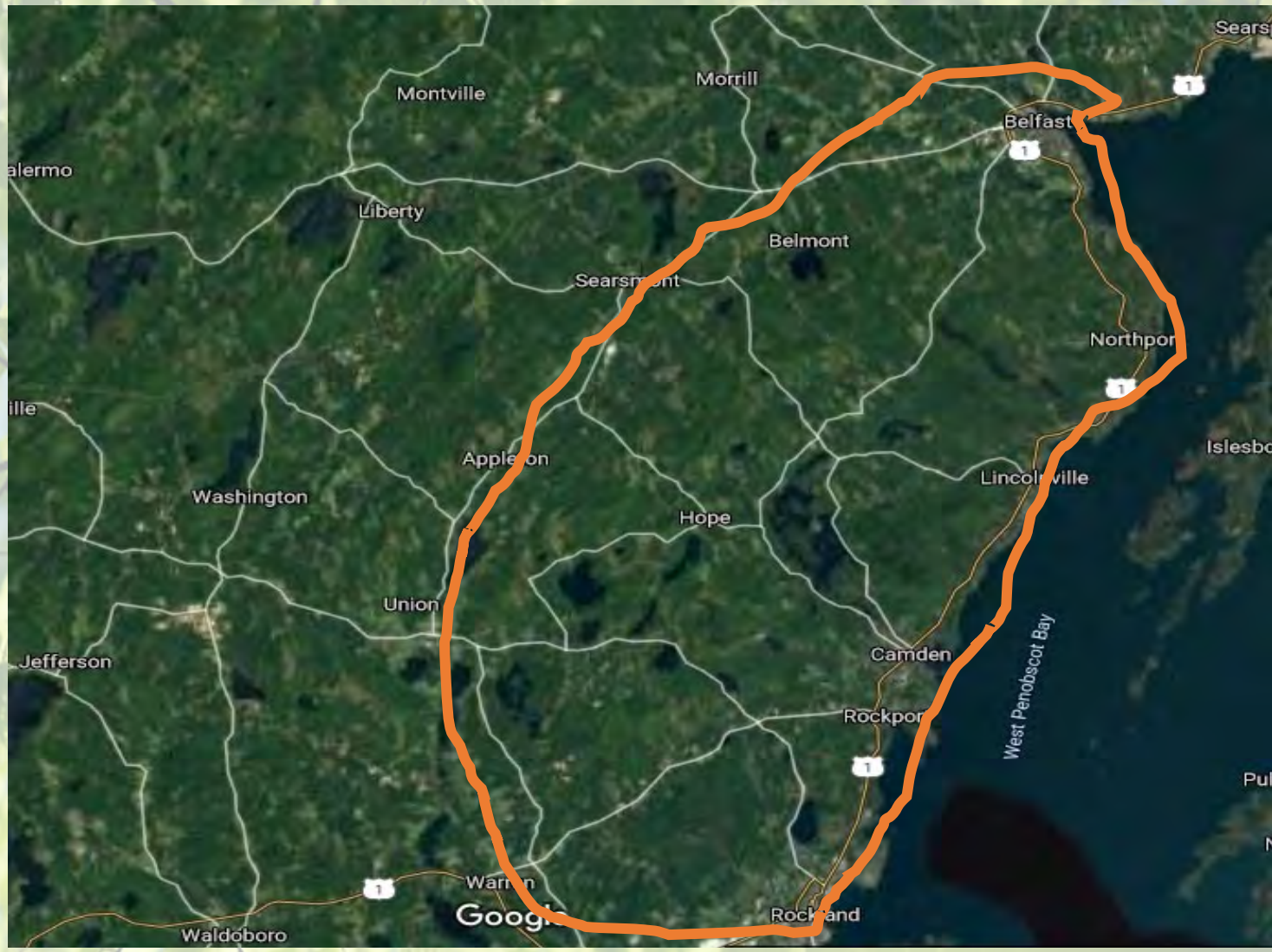
Ontario Out of Doors Magazine

Beech leaf disease (BLD)

- **BLD was confirmed in Maine in late May 2021.**
- **Lincolnville, ME.**
- **Closest previous known location was in Massachusetts.**
- **Beech leaf disease can kill both American and European species of beech – also impacts Asian beeches**
- **This map will be changing significantly**



The ‘current’ area of interest in Maine



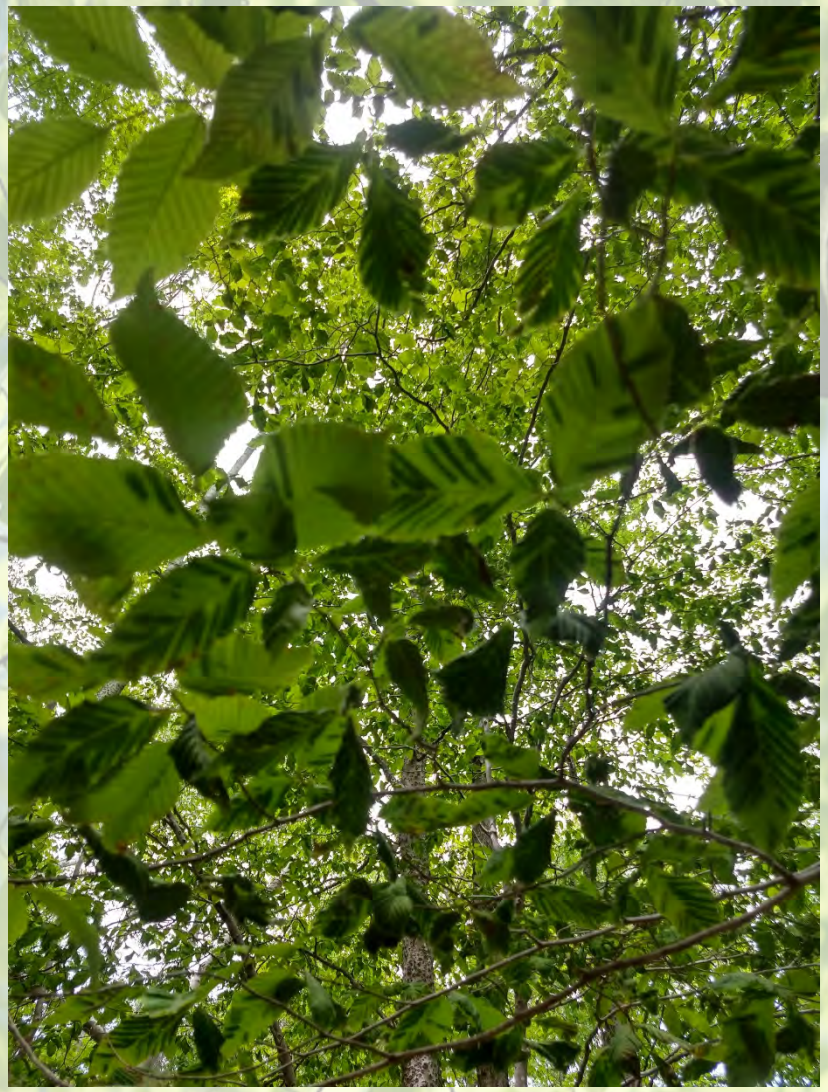
Beech leaf disease (BLD)

- **Banding of leaves**
  - **Symptoms are most easily seen by observing beech leaves from the forest floor**
- **Distorted leaf growth**
- **Leathery leaves**
- **Typically starts in understory beech and most severe among beech regeneration/sprouts in the understory**
  - **Mature trees are seldom killed**
- **Moves into the mature beech over time**
  - ***This year throughout the BLD region, things have been different**

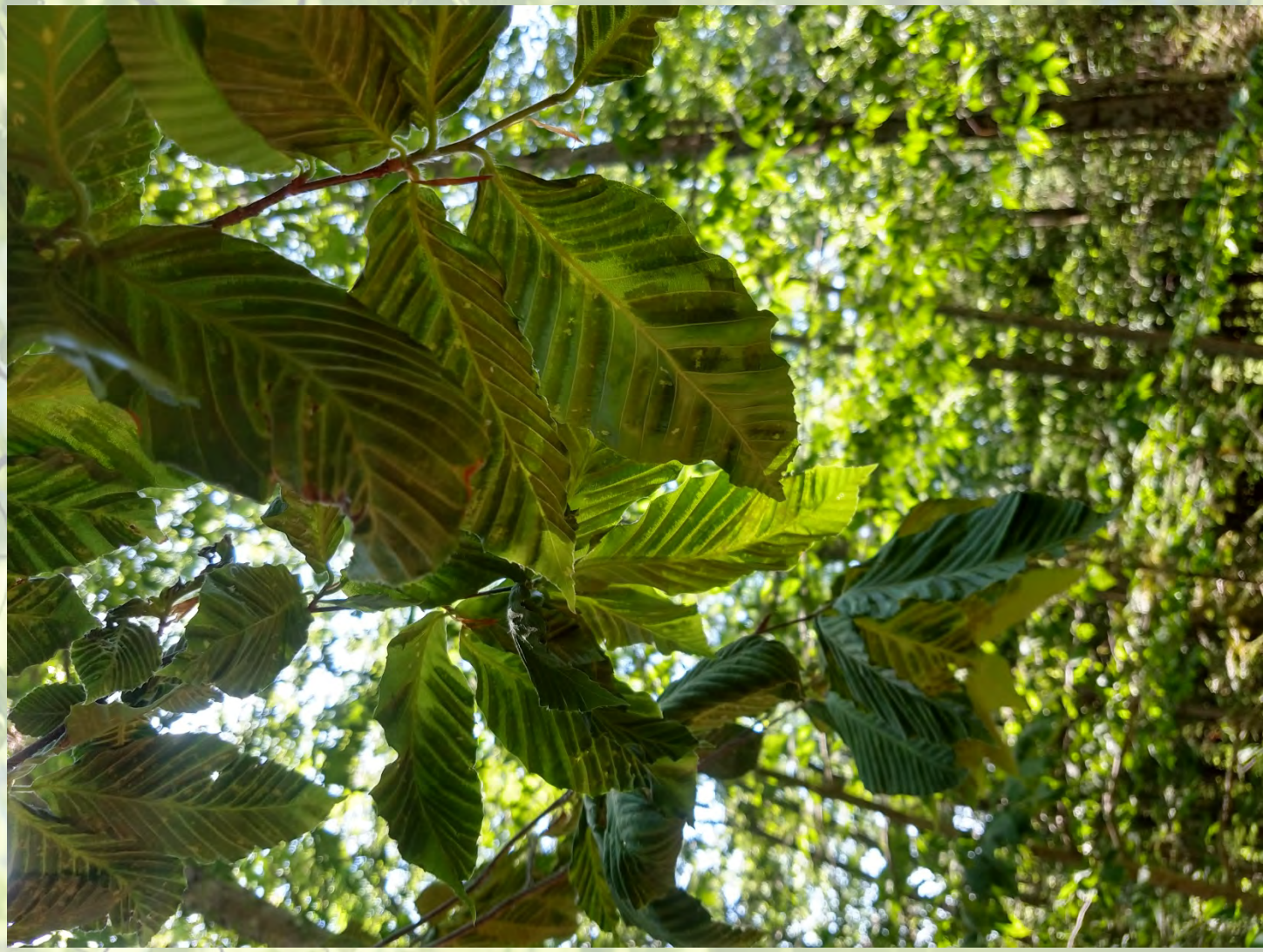
Raised interveinal segments, leaf deformation – some leaves are not affected.

Banding is less apparent from above, leaf coloration varies

Banding is best seen looking up into the canopy from below.

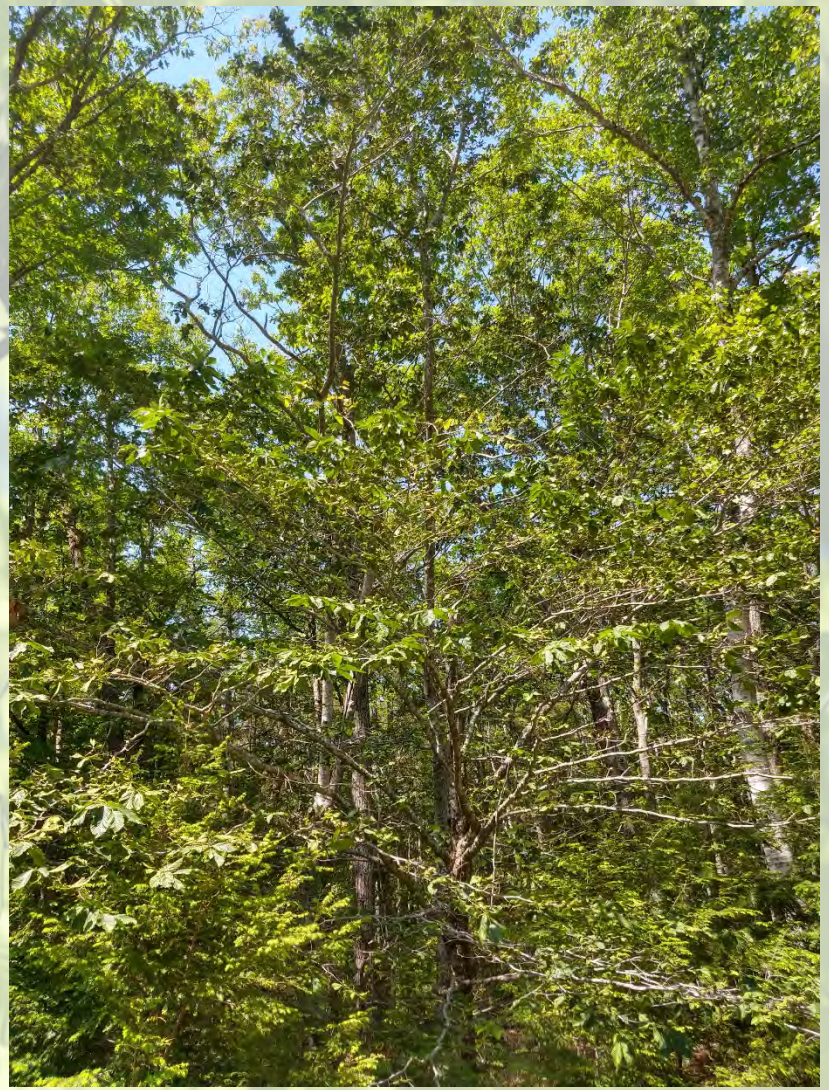


Sever banding and leathery, rough textured leaves



BLD ID at 45mph

- **Look for canopy gaps**



What causes BLD? Good question…

- **Researchers aren't 100% sure, but have found a microscopic roundworm, a nematode, associated with the disease**
  - **Likely not that simple and other organisms may contribute**
  - **There is talk about an associated bacteria**
- **There seems to be a connection between bodies of water and BLD**

Many More Questions Than Answers

- **How does it spread?**
  - **Sanitation practices after a site visit?**
- **What organisms are involved?**
- **How/Why do symptoms develop? Why the advanced symptoms throughout New England in 2021?**
- **What is the interaction between beech bark disease and beech leaf disease?**
- **Nematodes are found in asymptomatic trees in areas not under impact.**
- **Nematodes have been found in other species than beech.**

Importance of Beech

- **→ We all know that beech is not highly appreciated by some foresters, and some will welcome the news of BLD, but**

- **High mast value for wide variety of wildlife species**
- **A top cavity nesting species**
- **Valuable to nutrient cycling and soils – has the highest nitrogen content of all hardwood species in the northeast**
- **Desirable qualities for specific wood products, great firewood.**

Will we one day have healthy beech trees?

- **Beech trees are genetically diverse (open pollinated)**
- **About 1 % of beech trees are resistant to the scale → resistant to the disease**
  - **Resistant trees clonally reproduce as sprouts, and thus are found in groups**
- **BLD could limit resistant regeneration**
- **BLD will make efforts to promote healthy beech even more challenging**