

Pine health issues in the southeastern U.S.



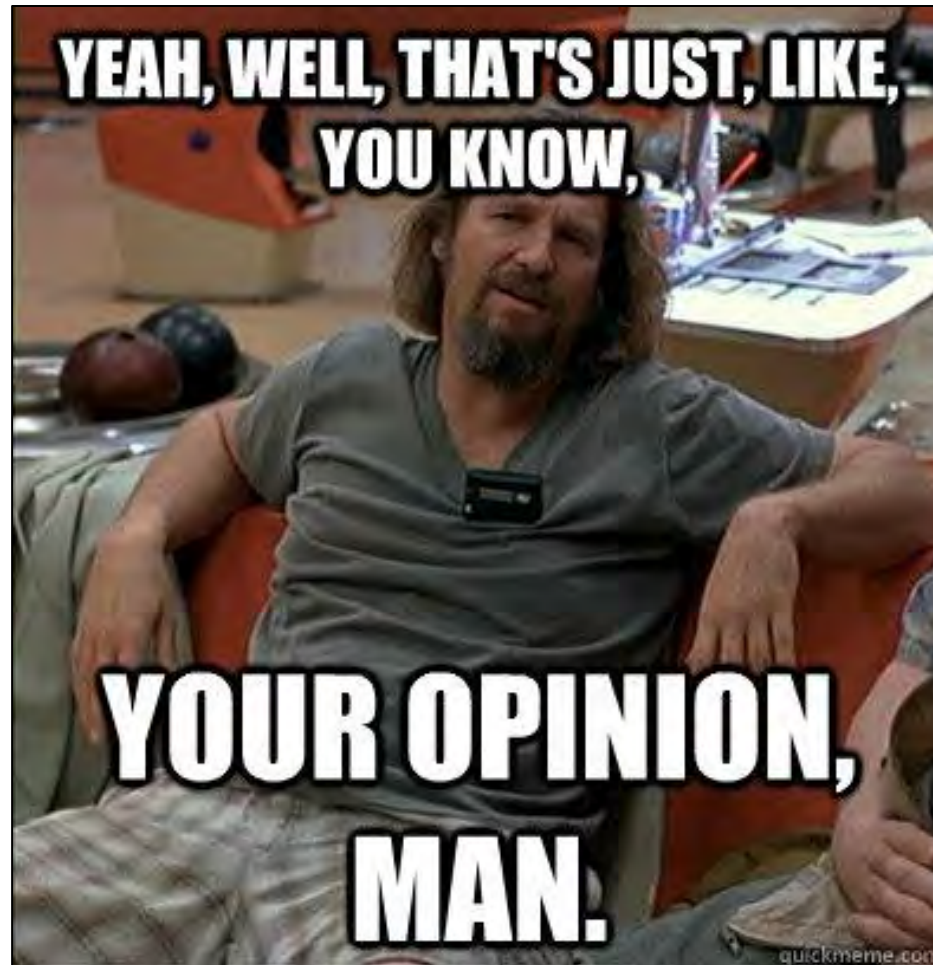
Dr. David Coyle
Clemson University
dcoyle@clemson.edu

 @drdavecoyle 

SREF Forest Health Webinar

14 April 2021

But first...a disclaimer...



What is forest health?

Depends on your objective...



Forest health means something without humans (trees die and they are recycled, i.e., ecosystem services), but it takes a new meaning when the sustainability of forest is challenged by human desires.



Trees die.

Hurricane Matthew, Sept. 2016, Statesboro, GA

Trees die.

Southern pine beetle infestation, Texas, August 1993

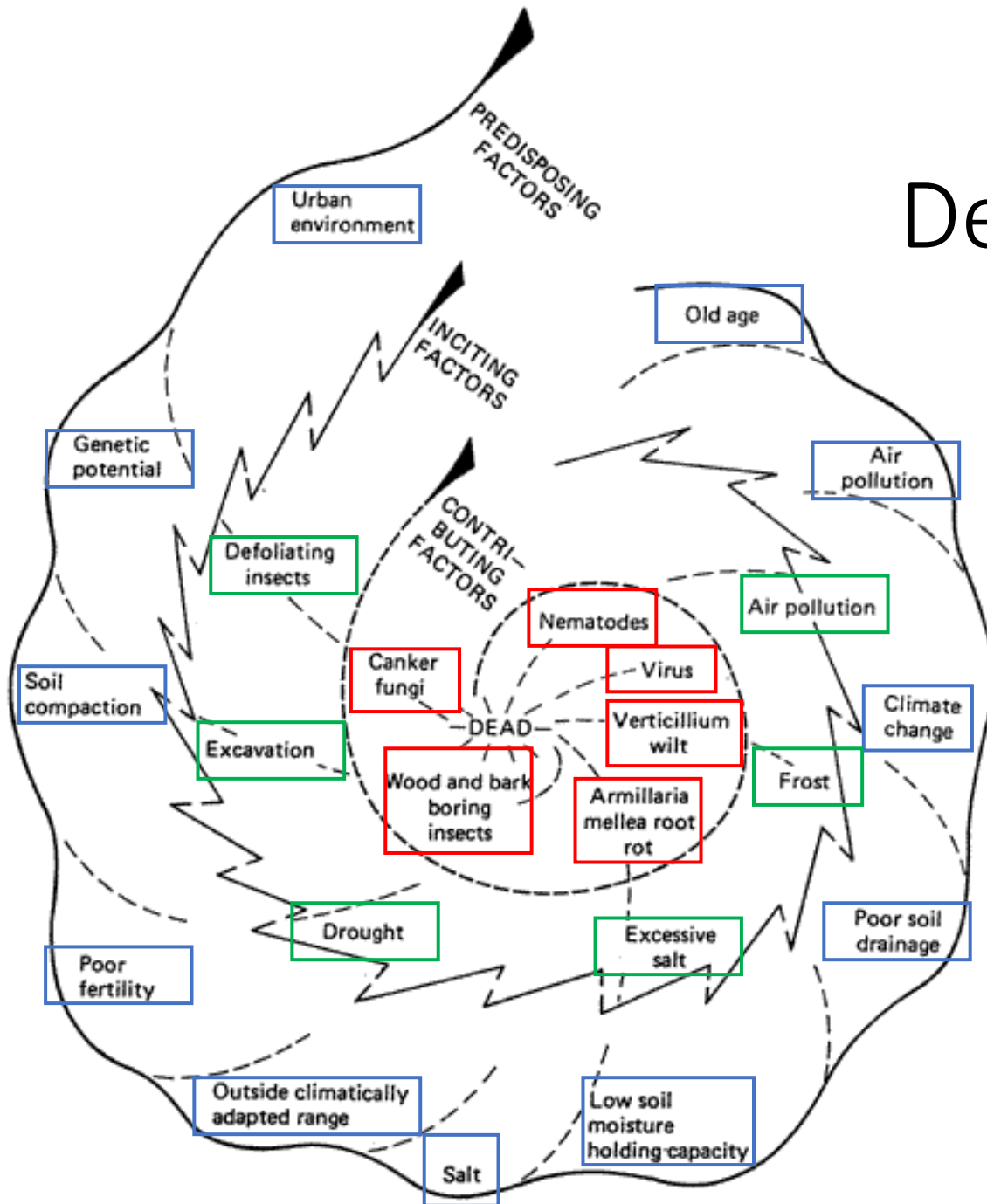
UGA2108092

Trees die.



Summer 2016, Suwanee, GA

Manion's Decline Spiral



Manion, P.D. 1981. Tree disease concepts. Prentice-Hall Inc., Englewood Cliffs, N.J. 399 p.

Predisposing factors

Chronic factors that, by themselves, don't noticeably harm a tree

Genetics

Soils

Tree planted outside its "comfort zone"

Old age

Inciting factors

Acute factors that harm – but don't kill –
a tree

Drought

Defoliation

Physical damage

Weather

Contributing factors

Factors that contribute to a tree's death – but wouldn't be there if the tree wasn't already on the way out

Most insects

Most fungi

Pine health is
influenced and
driven by all these
factors

Predisposing

Historical land use (now)



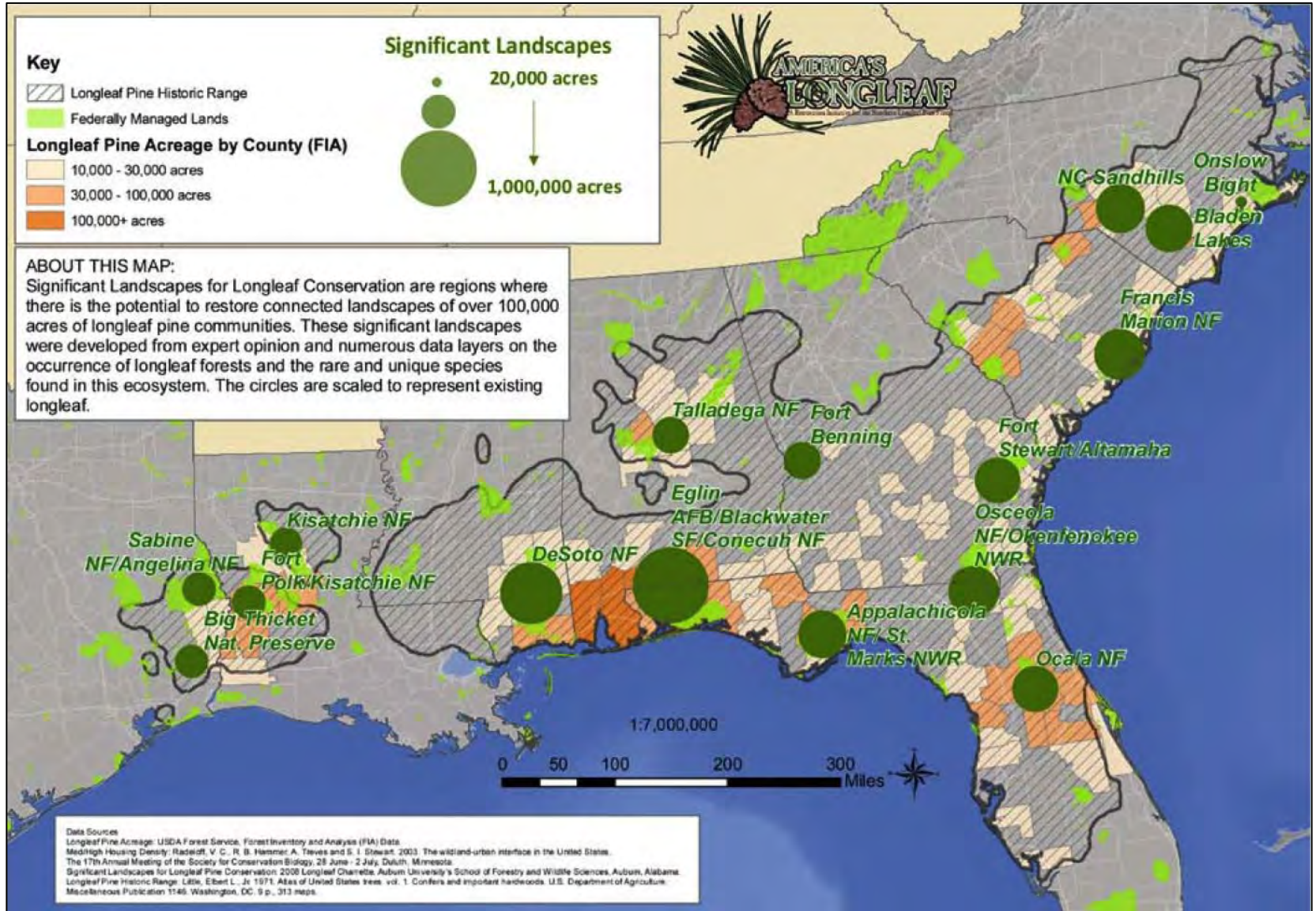
Predisposing

Historical land use (then)



Predisposing

Right tree, right site



Predisposing

Right tree, right site



Predisposing

Commercial forestry and Intensive management



Predisposing

Management

Competition control



Predisposing

Competition control



02.07.2012 11:41



Predisposing

Management

Thinning

Lack of thinning – this stand is 17 years old!

02.07.2012 15:48

Predisposing

Management

Neglect



Predisposing

Management

Fire (a lack of)



Inciting

Management

Fire (too hot)



R. E. Evans

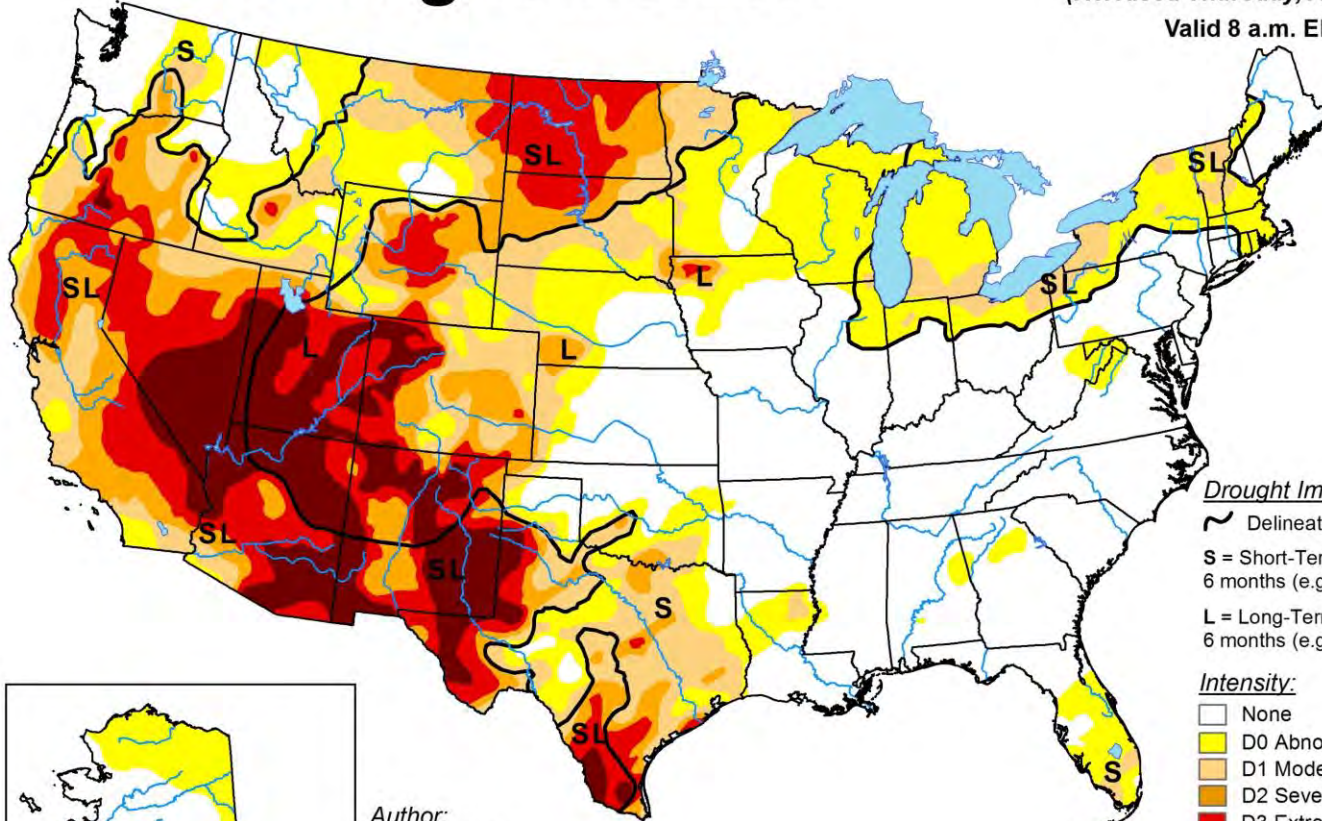


Inciting


Drought

U.S. Drought Monitor







April 6, 2021
(Released Thursday, Apr. 8, 2021)
Valid 8 a.m. EDT



Drought Impact Types:

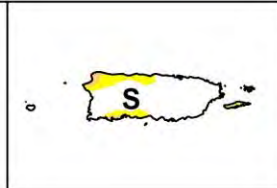
-  Delineates dominant impacts
- S** = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
- L** = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

Intensity:

-  None
-  D0 Abnormally Dry
-  D1 Moderate Drought
-  D2 Severe Drought
-  D3 Extreme Drought
-  D4 Exceptional Drought

Author:
Deborah Bathke
National Drought Mitigation Center

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>



droughtmonitor.unl.edu

Inciting

Defoliation

Pine sawflies (*Neodiprion* spp.)

Most impactful defoliators of pines

All pines are susceptible

Native, several species across the country

Damage is usually spotty, but large infestations do occur

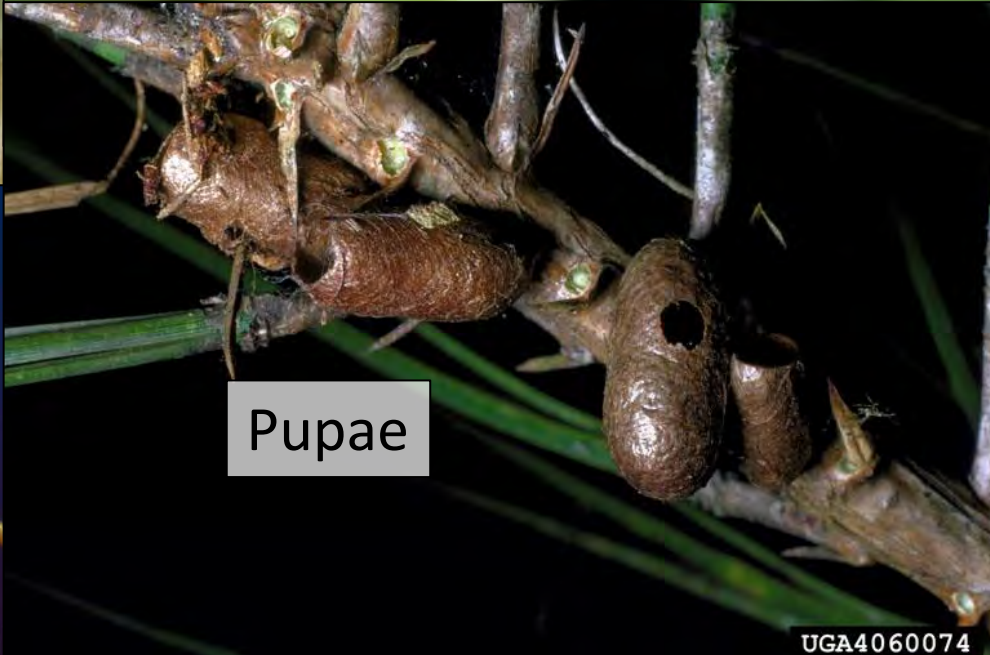
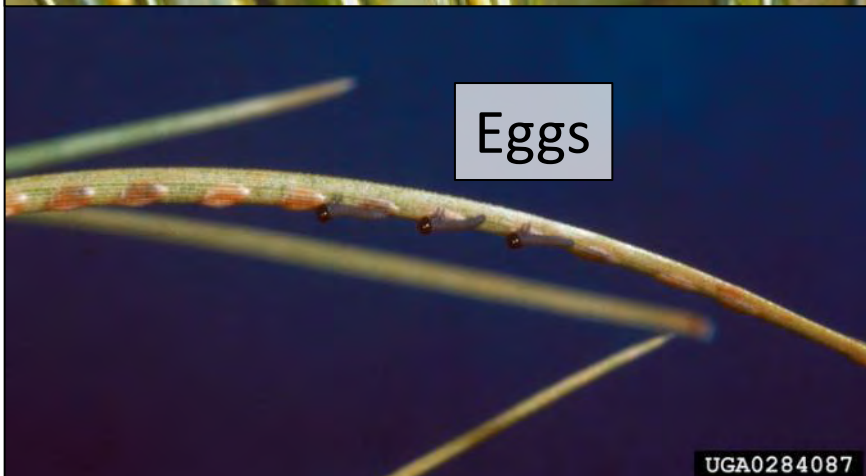
Usually more damage in single-species plantations

Most common on younger trees

Repeated defoliation can reduce growth and
potentially cause tree mortality

Inciting

Redheaded pine sawfly (*Neodiprion lecontei*)



Inciting

Pine sawfly damage



5383259

Inciting

Pine sawfly damage



Inciting

Pine sawfly damage



Inciting

Physical damage

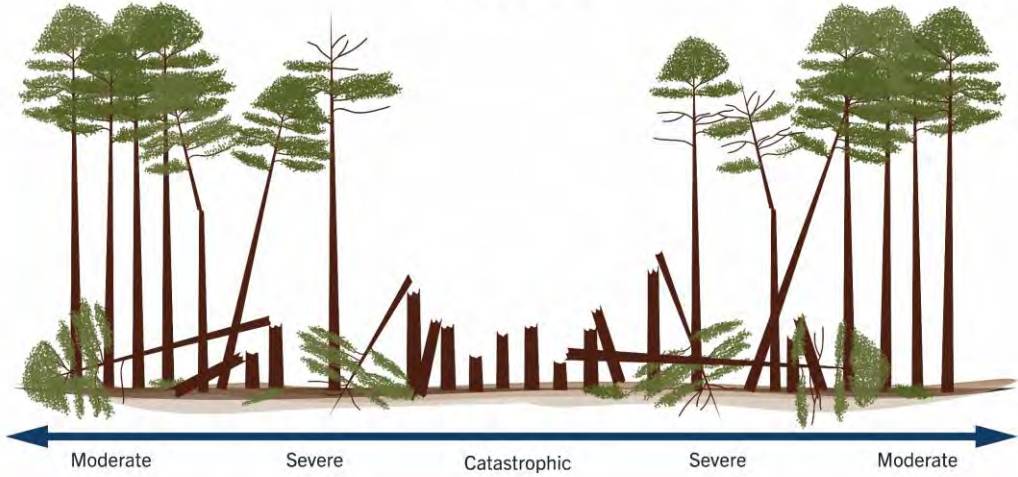


Inciting

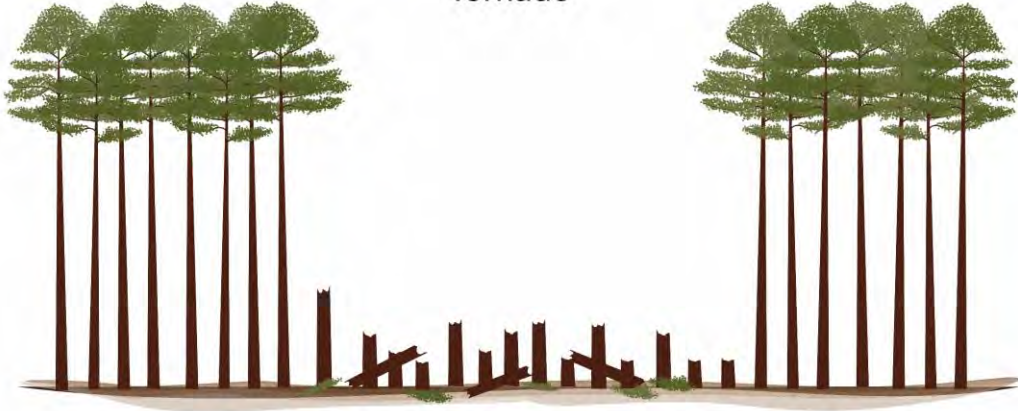
Physical damage / Weather



Hurricane



Tornado



Inciting

Physical damage / Weather



Inciting

Pitch canker (*Fusarium circinatum*)

Named for large amount of resin at canker

Can be problem in seed orchards

Occasional outbreaks

Insect association



Pissodes nemorensis



Inciting



Primary symptoms are
dead needles and
extremely heavy resin
flow on the terminal
leader(s)

UGA1247233



Chief hosts of this disease are slash, shortleaf, Virginia, and longleaf pines



Resin soaking of the
internal canker on a
terminal leader

Heavy pitch flow on
the terminal leader

Inciting

FL seed orchard

June 2016

Pitch canker episode

Damage $\frac{1}{2}$ way up tree

Trees ~60' tall

20% infected





Inciting

Severe infection can result in almost 100% of the stems in a stand being infected

Sanitation is the only forestry control measure



Most insects and
diseases of pines are
contributing factors

Bark beetles

All in the Southeast are native

Most attack stressed trees

Exception = southern pine beetle

Feed on phloem

Phloem = “the sleeve of life”

Feeding (girdling) consumes phloem

Trees die from lack of nutrition

Native bark beetles

Ips calligraphus



Ips pini



Ips grandicollis



Ips avulsus



Dendroctonus terebrans



Dendroctonus valens



Dendroctonus frontalis



Southern pine beetle

Ips calligraphus



Ips pini



Ips grandicollis



Ips avulsus



Dendroctonus terebrans



Dendroctonus valens



Dendroctonus frontalis



Southern pine beetle

(*Dendroctonus frontalis*)

Native to North & Central America

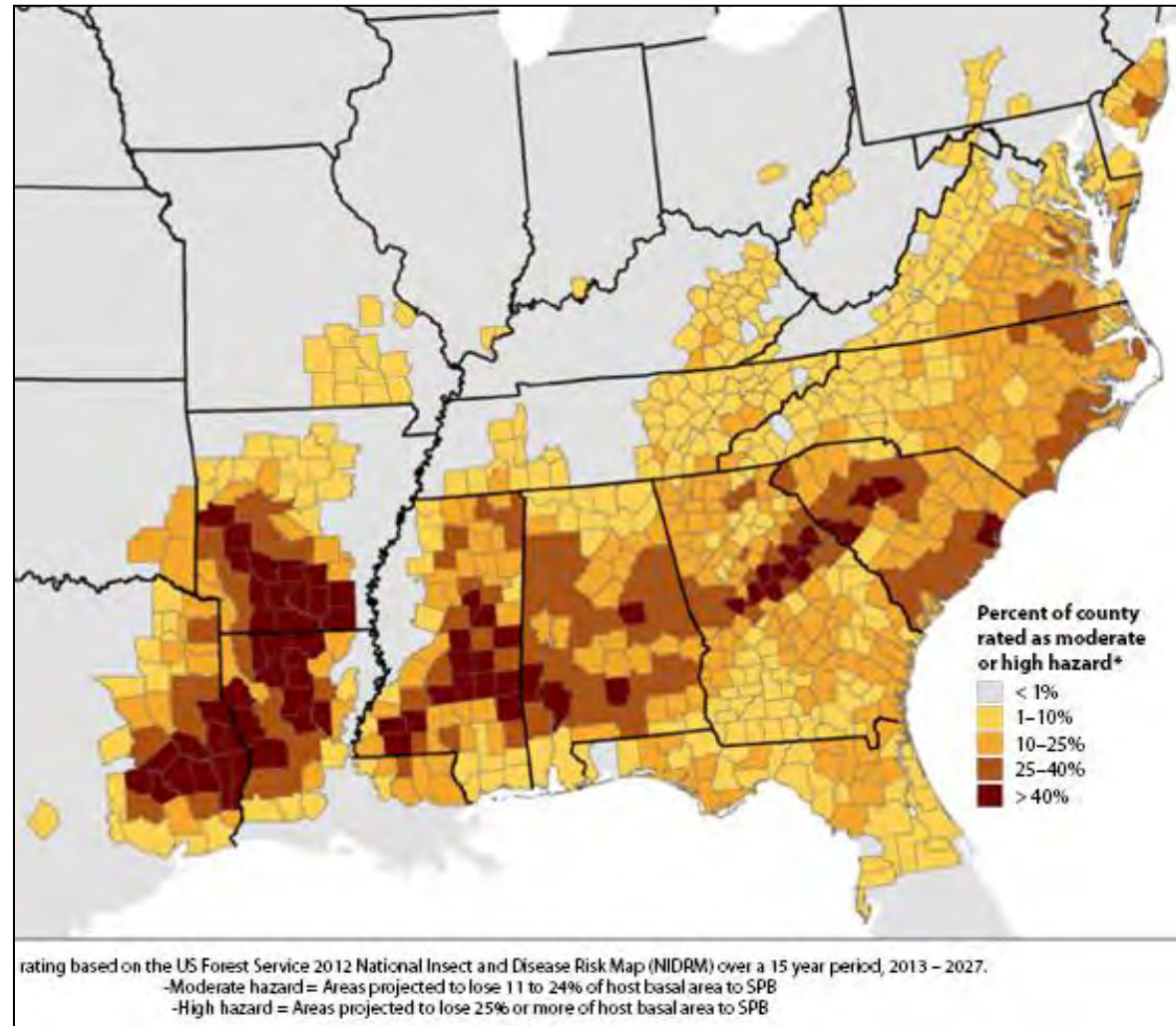


Southern pine beetle

Attack weakened, damaged, or dying trees

SPB populations oscillate (i.e. can “disappear” and then explode)

Outbreaks usually coincide with droughts



Southern pine beetle

Green needles on the ground



Southern pine beetle

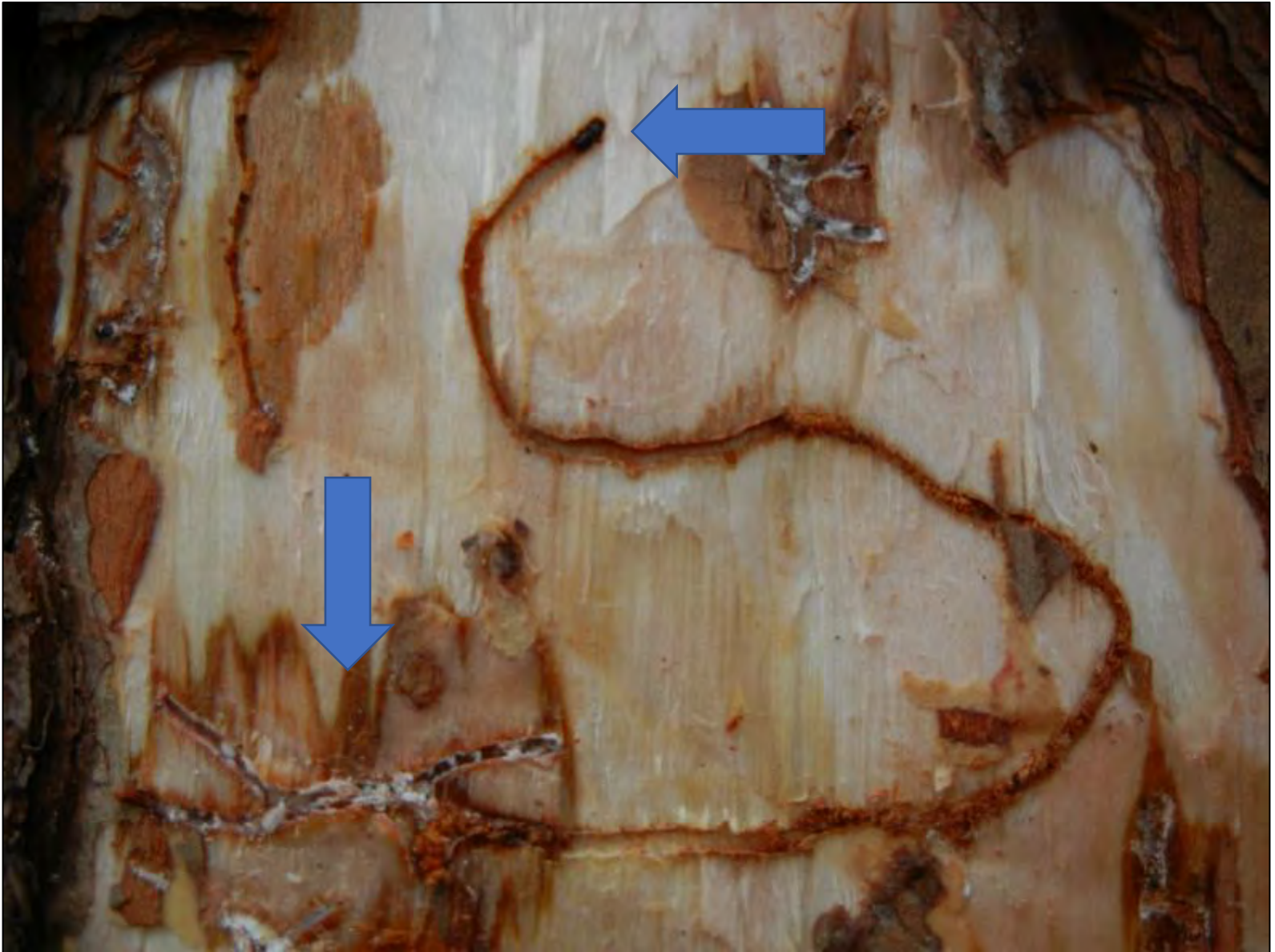


Adult attacks tree

**Mass attack &
Pitch tubes**



Southern pine beetle



Southern pine beetle



S-shaped galleries

Larvae feed on phloem



Southern pine beetle



Blue stain fungi

**Tiny circular
exit holes**



Southern pine beetle management



Trapping



Salvage



Predators



Buffer



Debark



Proper management

11/14/2012

2012 SPB Spot

After Thinning (2011) and Southern
Pine Beetle (2012)



Southern pine beetle webinar 6 May 2020 by Dr. John Nowak (USFS)

The image is a screenshot of a web browser displaying the Southern Forest Health website. The browser's address bar shows the URL: southernforesthealth.net/webinars/webinar_folder_view?b_startint=58&C=. The website header includes a navigation menu with links for ABOUT, DIRECTORY, NEWS, EVENTS, WEBINARS, and CONTACT, along with social media icons for Facebook, Twitter, and YouTube. The main content area features the 'FOREST HEALTH' logo and a search bar. Below the search bar are four filter buttons: Plants, Insects, Diseases, and Other. A large red arrow points to the search bar. On the left, there is a 'Webinars By Topic' section with three items: 'Annosum Root Rot', 'Asian Longhorned Beetle', and 'Chinese Privet'. On the right, the 'WEBINAR SEARCH:' section displays a search result for 'Southern pine beetle: Biology, monitoring and management' on 'May 06, 2020'. The description states: 'The southern pine beetle (SPB), *Dendroctonus frontalis*, is the most destructive insect pest of pine in the southern United States. Dr. John Nowak will be giving a general overview of the biology, range and impact of and possible management strategies for preventing the spread of this insect pest.' A 'VIEW' button is located below the description. At the bottom of the page, there are logos for USDA and Southern Regional Extension Forestry, along with a copyright notice: 'Copyright © 2015 Southern Regional Extension Forestry'. The Windows taskbar at the bottom shows the search bar with 'Type here to search' and the system tray with the date '10:59 AM 3/17/2021'.

Webinars — Southern Forest H | X +

southernforesthealth.net/webinars/webinar_folder_view?b_startint=58&C=

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Plants Insects Diseases Other

Webinars By Topic

Annosum Root Rot

- Heterobasidion (aka Annosum or Fomes) Root Disease of Pines in the South

Asian Longhorned Beetle

- Asian longhorned beetle: A new invasive pest in South Carolina

Chinese Privet

- Privet biology and management in

WEBINAR SEARCH:

Southern pine beetle: Biology, monitoring and management
May 06, 2020

The southern pine beetle (SPB), *Dendroctonus frontalis*, is the most destructive insect pest of pine in the southern United States. Dr. John Nowak will be giving a general overview of the biology, range and impact of and possible management strategies for preventing the spread of this insect pest.

VIEW

Laurel wilt biology, monitoring, and management

USDA Southern Regional Extension Forestry

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Log in

Type here to search

10:59 AM
3/17/2021

Ips bark beetles

*Ips
calligraphus*



*Ips
pini*



*Ips
grandicollis*



*Ips
avulsus*



*Dendroctonus
terebrans*



*Dendroctonus
valens*



*Dendroctonus
frontalis*



Ips bark beetles

Common in SE US

Generally attack
weakened or stressed
trees

Male starts gallery, calls
female using odors
(pheromones)

Can cause mortality
during droughts



A.



B.



C.



D.





Tree susceptibility

Attacks occur on stressed and injured trees

Tree stress caused by:

- Storms, including hurricanes and tornados

 - Wind damage

 - Lightning

- Fire damage

- Mechanical damage

- Drought

- Biotic agents:

 - Vegetative competition

 - Pathogens



Ips bark beetles



UGA0013087

Turpentine beetles

Ips calligraphus



Ips pini



Ips grandicollis



Ips avulsus



Dendroctonus terebrans



Dendroctonus valens



Dendroctonus frontalis



Black turpentine beetle

(*Dendroctonus terebrans*)



Attack weakened or stressed trees

Can cause mortality during droughts



Black turpentine beetle



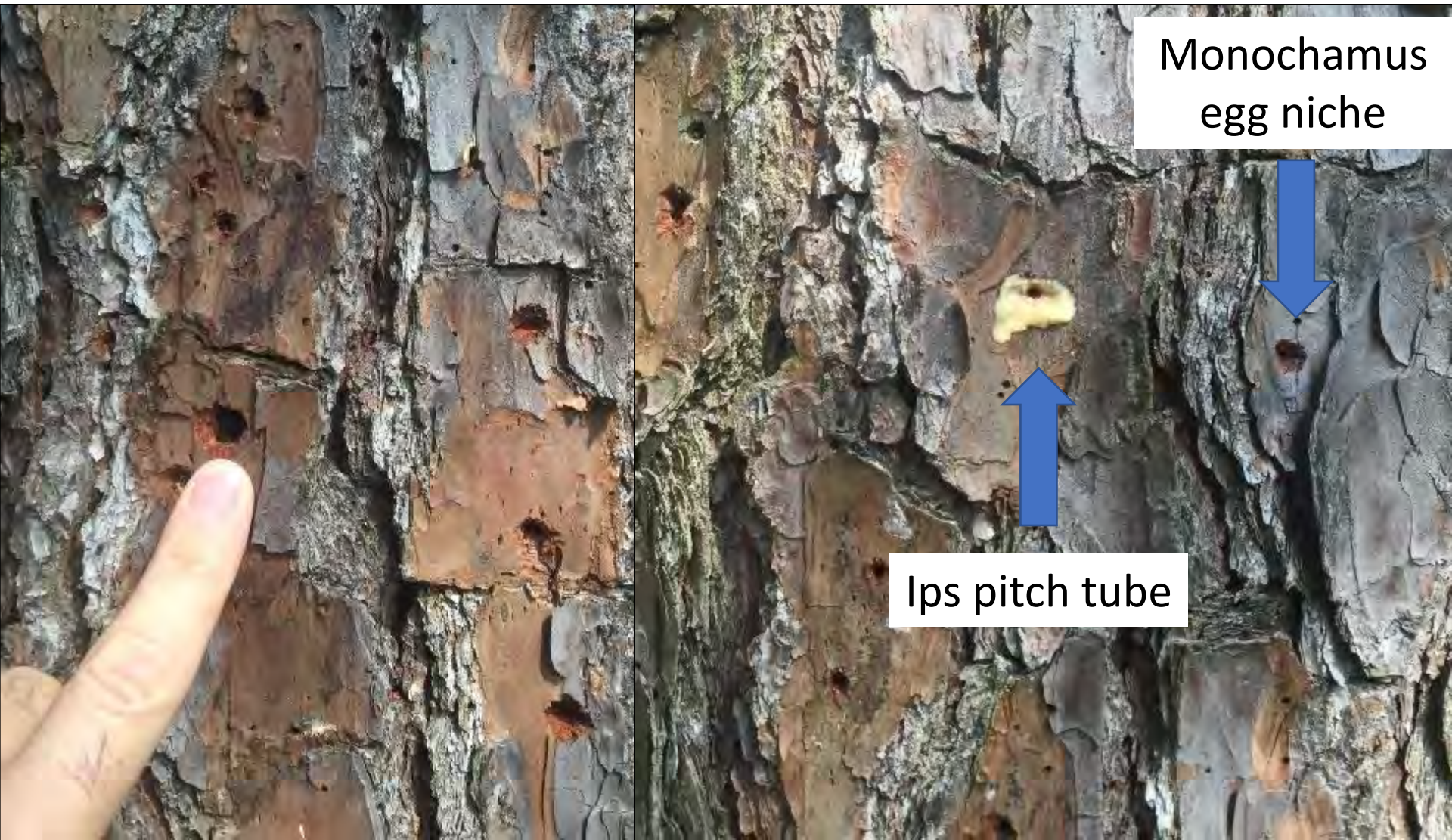
Black turpentine beetle



Pine sawyer beetles
(*Monochamus* spp.)



Pine sawyer beetle egg niche



Monochamus
egg niche

Ips pitch tube

Pine sawyer beetle larvae



Eastern pine weevil / Deodar weevil (*Pissodes nemorensis*)



Ambrosia beetles

Many, many different kinds

Most in the Southeast are native

Most attack stressed trees

- Natural areas

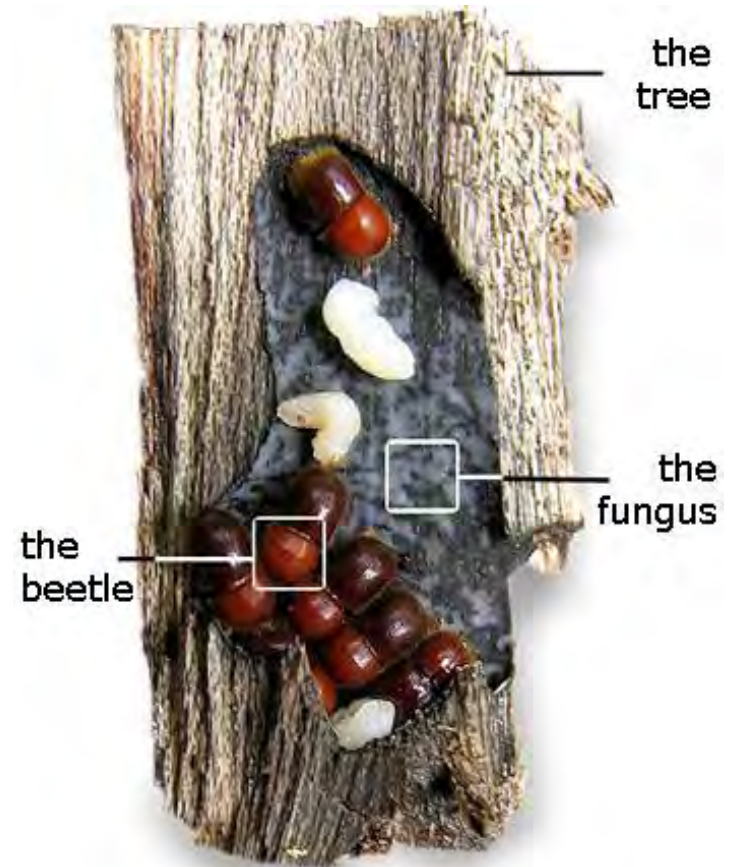
- Nurseries

- Urban environments

- Anywhere there's a stressed tree....

Ambrosia beetles

Create fungal gardens (which larvae eat)



Platypus spp. = most common
pine ambrosia beetle



Hylastes spp. root-feeding beetles

Three native and one nonnative in SE US

All colonize WEAK and DYING pines

Implicated in “pine decline”

Don't believe it!



Fusiform rust

(Cronartium quercuum f. sp. fusiforme)

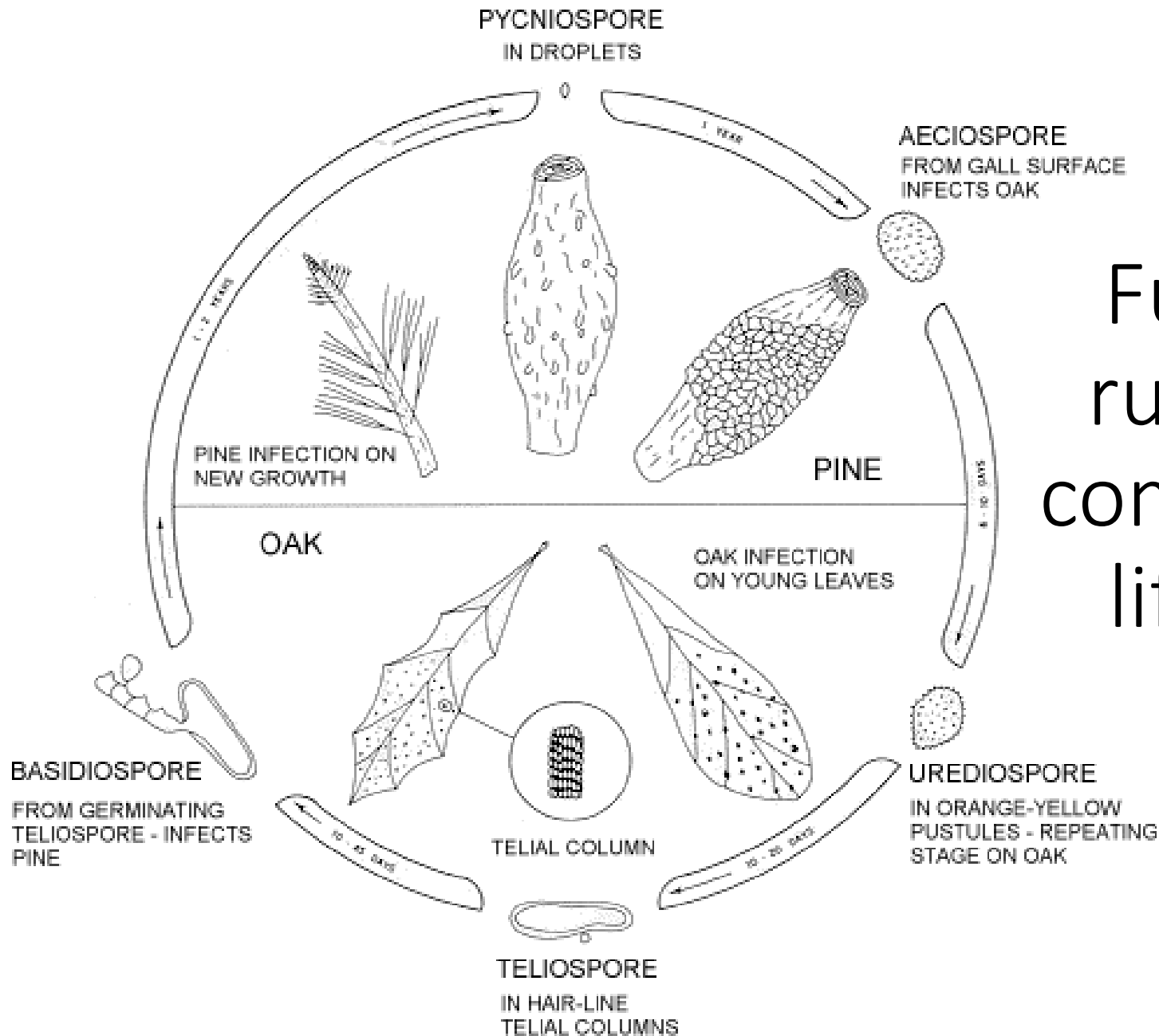
Worst forest disease in SE US

Stem / branch cankers

Nursery and plantation issue



LIFE CYCLE OF *Cronartium fusiforme*



Fusiform rust has a complicated life cycle



What you really
need to know is

the fungus
alternates
between oak and
pine hosts

Fusiform rust



Stems often break at canker



Fusiform rust management



Chemical treatment in nurseries



Resistance through breeding



Fertilize after age 8



Luck

Annosum root rot (*Heterobasidion irregulare*)

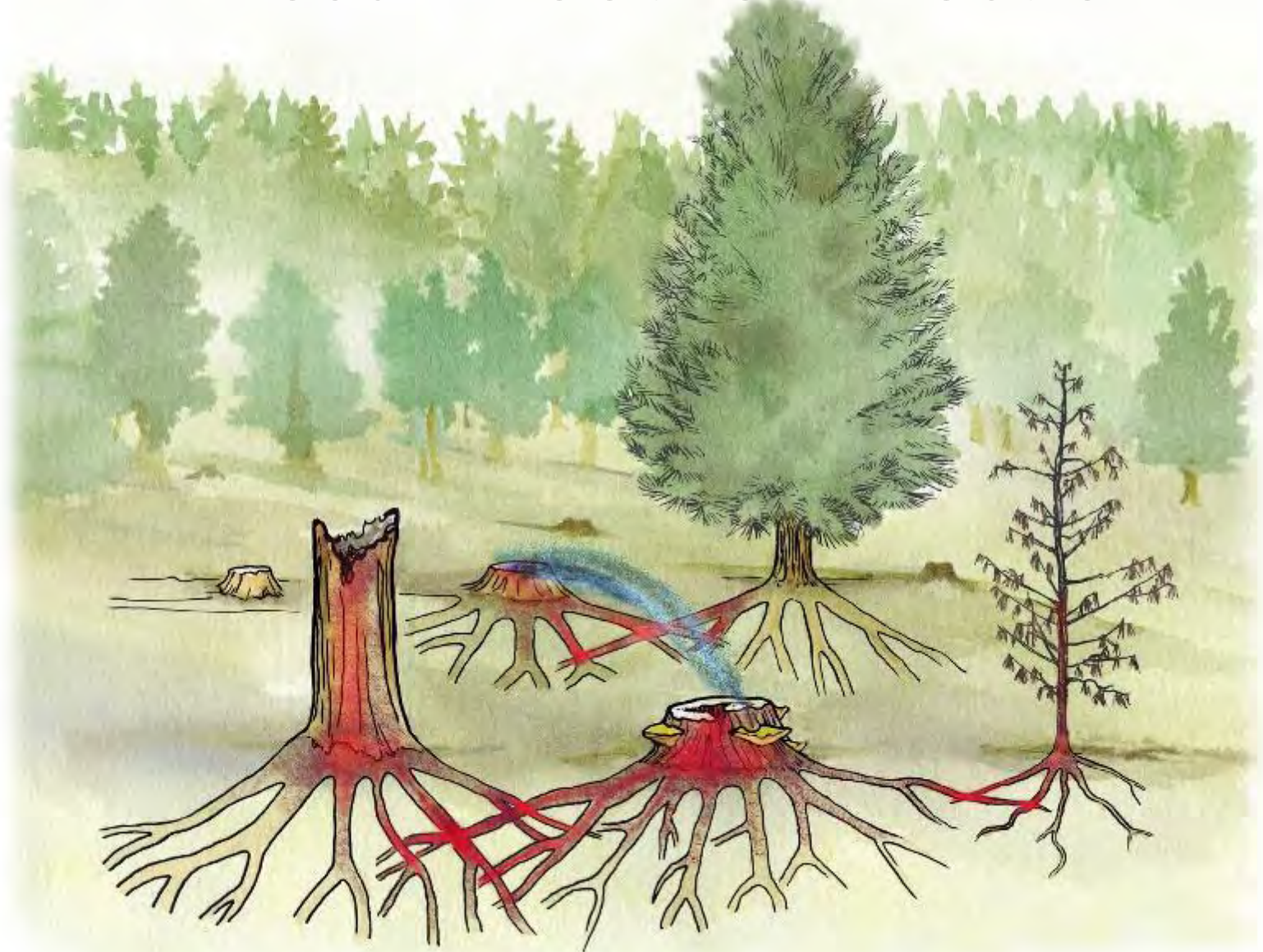
One of the worst forest diseases in SE US

Invades/degrades root system

Spores spread by wind



Annosum root rot infection



Annosum root rot

Looks like pines just “giving up”
Similar to early Ips damage,
BUT more loss of foliage than browning
Look for pockets, especially on former ag lands
Trees prone to falling over (this is different than with Ips!!)

01.07.2012 15:45

Annosum root rot



Annosum root rot risk factors

High

Sandy / sandy loam soils at least 12”
deep with good drainage

Former ag lands

Medium

Silt / silt loam soils, 12” deep

Low

Poorly drained clay / clay loam

High water table



Bee Branch, AL
Bankhead NF quad sheet

Areas of hazard for
annosum root rot:

High (red)

Moderate (yellow)

Low (green)

USGS 1:24000 scale

Annosum root rot management



Clearcuts halt disease progression

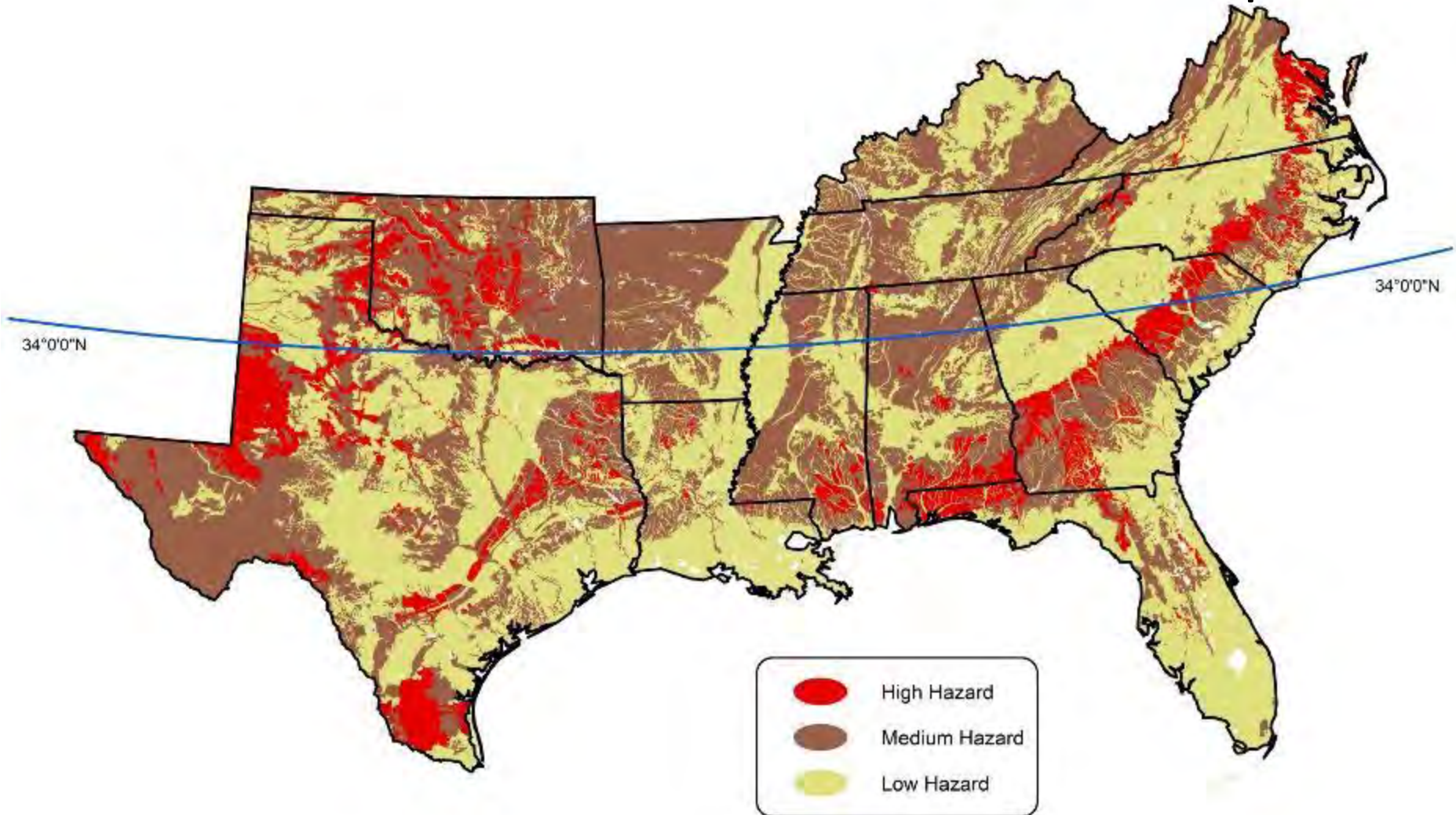


Thin during summer months



Stump treatment

Annosum root rot hazard map



Brown spot needle blight (*Mycosphaerella dearnessii*)

Primarily damages longleaf, also loblolly/slash

Delays growth, but rarely kills tree

Spores spread by wind/rain



Brown spot needle blight





Brown spot
needle blight

Brown spot needle blight management

Plant resistant seedlings

Promote aeration in young stands

Foliar fungicides

Fire!



Needlecast disease

Several species of fungi

Lophodermium spp. are most common

Depending on species, infect current or last year's needles (Lopho => 2-yo needles)

Needles brown, die, fall off

Lopho fruiting bodies look like little footballs

Needlecast disease

Needle death progresses from tips inward

Current OR last year's needles



Needlecast disease look-alike

Diplodia tip blight (*Sphaeropsis sapinea*)

Needle death all at once



Needlecast disease look-alike

Pine needle rust (*Coleosporium* spp.)

Little “wings” on the needles



Needlecast disease look-alike

Normal pine needle senescence

Always older needles



Questions?

dcoyle@clemson.edu



drdavecoyle

@drdavecoyle



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CONSERVATION**



COOPERATIVE EXTENSION

College of Agriculture, Forestry and Life Sciences