

Woodland Stewards Webinar Series
Session 3: Identifying and Managing Woodland Threats

Audio starts at 7PM Eastern (6PM Central)
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WS WOODLAND STEWARDS
 A Regional Extension Program for Landowners

Session 3 Moderator
 Dr. Robert Bardon




The Woodland Stewards Webinar Series was created by a team of Extension professionals from the following programs:



Identifying and Managing Woodland Threats

Dr. David Coyle

 CLEMSON COOPERATIVE EXTENSION

Dr. Lauren Pile

 USDA

Dr. Hank Stelzer

 Extension University of Missouri

WS WOODLAND STEWARDS
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Learning Outcomes

- At the end of this evening, you will:
- Have learned a few, simple pest population dynamic principles
 - Have an appreciation for how those principles play out in a few representative pest scenarios (insect, disease, and invasive plant)
 - Understand why good forest management is key to a healthy woodland



Question: How is an unmanaged woodland like an unweeded garden?



Question: How is an unmanaged woodland like an unweeded garden?



"O God, God, how weary, stale, flat and unprofitable seem to me all the uses of this world! Fie on't, ah, fie, 'tis an unweeded garden that grows to seed. Things rank and gross in nature possess it merely." Hamlet: Act One, Scene Two











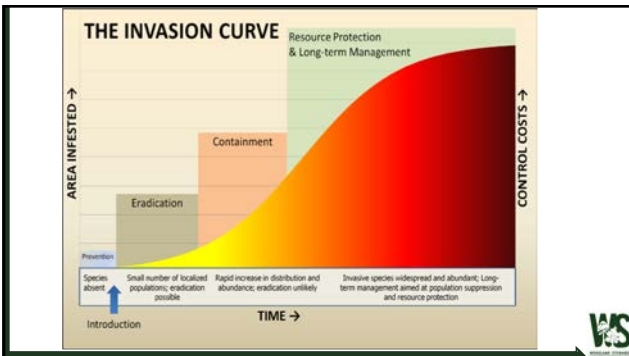




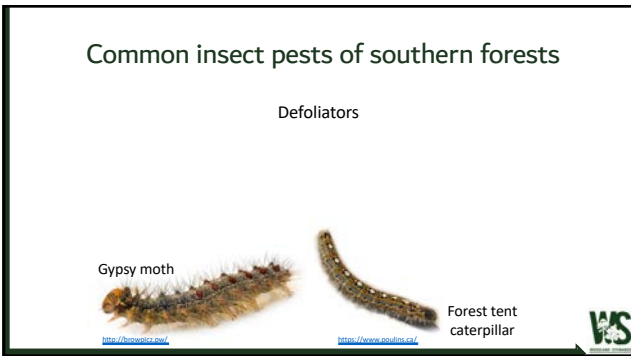


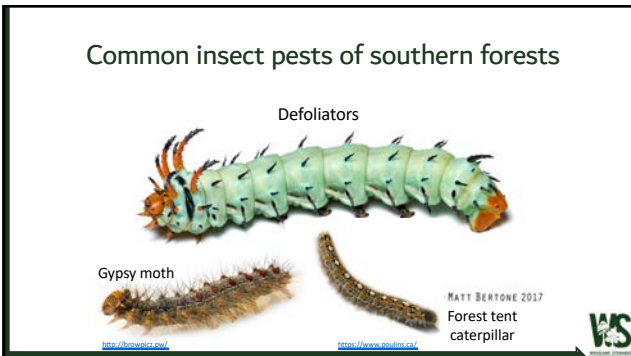
A few pest principles...











Question: How much does forest management impact forest health?



Forest management!
It matters.



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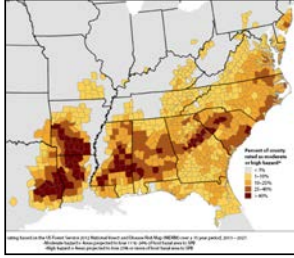
Southern pine beetle (*Dendroctonus frontalis*)
Native to North & Central America



Southern pine beetle

Attack weakened, damaged, or dying trees

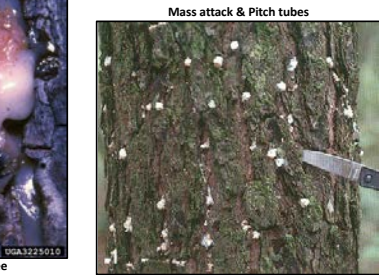
SPB populations oscillate (i.e. can "disappear" and then explode)



Southern pine beetle



Adult attacks tree



Mass attack & Pitch tubes



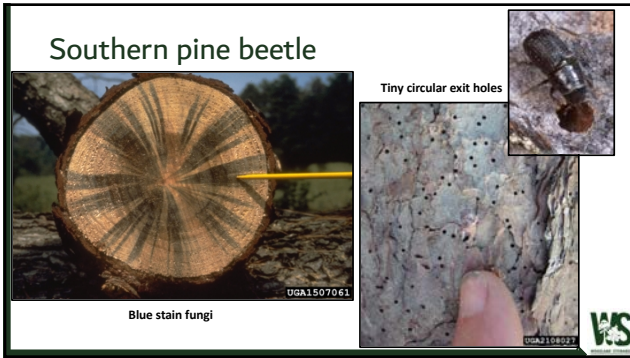
Southern pine beetle

Larvae feed on phloem

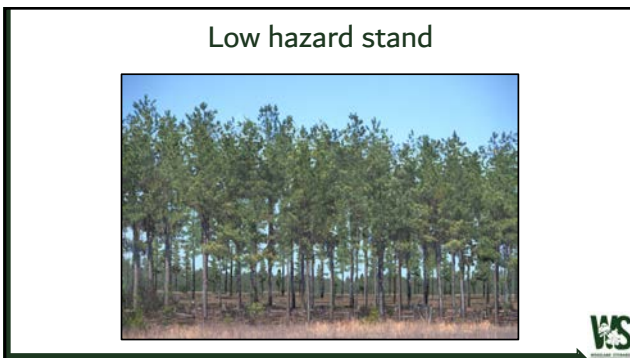


S-shaped galleries









Southern pine beetle management



Trapping



Salvage



Predators



Buffer



Debark






Proper management



SPB Prevention Program

- Program started in 2003
- Designed to take a proactive approach to reducing the impact of SPB
- Cost-share provided to thin pine stands
- Administered by USFS FHP but implemented in 12 National Forests and 11 States
- Treated more than 1.2 million acres




Southern pine beetle Mississippi Outbreak, 2012

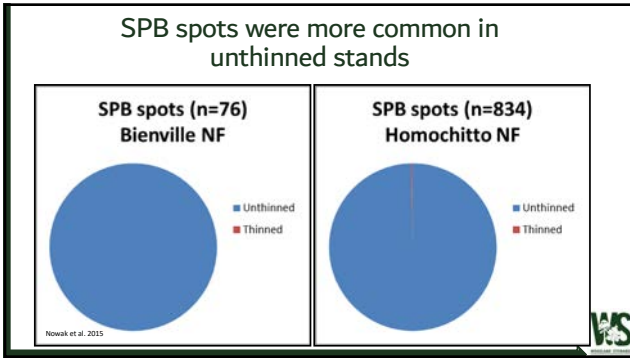
- Total spots = 910
- Bienville NF: 100% of spots in unthinned
- Homochitto NF: 99.7% spots in unthinned

entomology & pathology

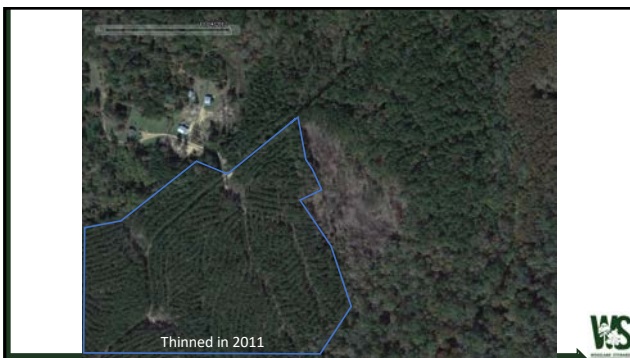
Southern Pine Beetle Infestations in Relation to Forest Stand Conditions, Previous Thinning, and Prescribed Burning: Evaluation of the Southern Pine Beetle Prevention Program

John T. Havlik, James B. Mosker, David R. Coyle, Chris A. Steiner, and Corvill Bowen 2015, Journal of Forestry 113: 454-462.















Forest management!
It doesn't matter.



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Emerald ash borer (*Agrilus planipennis*)
Native to Asia

Toledo, Ohio



2006 (Before EAB)

2009 (After EAB)



Emerald ash borer (*Agrilus planipennis*)
Native to Asia

Millions of trees. Billions of dollars.



2006 (Before EAB)

2009 (After EAB)



Emerald ash borer range map



Emerald ash borer life cycle



Emerald ash borer life cycle



As early as late March
 Peak in April/May
 End in late June

Has preceded leaf-out
 by 1-2 wks; adults can
 survive 1-2 wks
 without food



Emerald ash borer life cycle



April-June

As early as late March
Peak in April/May
End in late June

Has preceded leaf-out
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Emerald ash borer life cycle



April-June

As early as late March
Peak in April/May
End in late June

Has preceded leaf-out
by 1-2 wks; adults can
survive 1-2 wks
without food



Adults feed on foliage



Emerald ash borer life cycle



April-June



Eggs hatch in
1-2 weeks

As early as late March
Peak in April/May
End in late June

Has preceded leaf-out
by 1-2 wks; adults can
survive 1-2 wks
without food



Adults feed on foliage



Emerald ash borer life cycle



Larval period = rest of spring/summer/fall/early winter



Emerald ash borer life cycle



Larval period = rest of spring/summer/fall/early winter



Winding galleries



Emerald ash borer life cycle



Larval period = rest of spring/summer/fall/early winter



Winding galleries



Frass-packed galleries

Pupate in Jan-Feb

Pupal chambers



Emerald ash borer management



Population monitoring



Emerald ash borer management



Population monitoring



Public outreach



Emerald ash borer management



Tree removal and sanitation



Emerald ash borer management



http://www.emeraldashborer.info/documents/Multistate_EAB_Insecticide_Fact_Sheet.pdf



Emerald ash borer management



Biological control



Emerald ash borer management




Biological control


Silviculture



Emerald ash borer management



Biological control
~~Silviculture~~



Time to take a break!



WOODLAND STEWARDS
A Regional Extension Program for Landowners

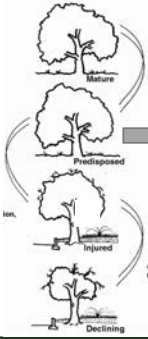
Forest management! It matters.



Oak Decline
DQA5056057






Oak Decline Factors

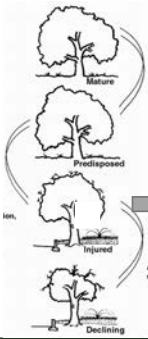


Predisposing

- High % red oak group species
- Advanced age (70-90+ years)
- Growing on ridges & upper slopes
- Shallow, rocky soil
- High stand density







Oak Decline Factors

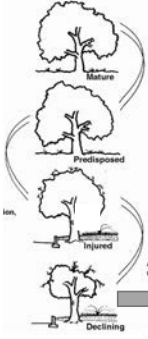


Inciting

- Drought
- Repeated defoliation
- Late frost in spring
- Storm damage







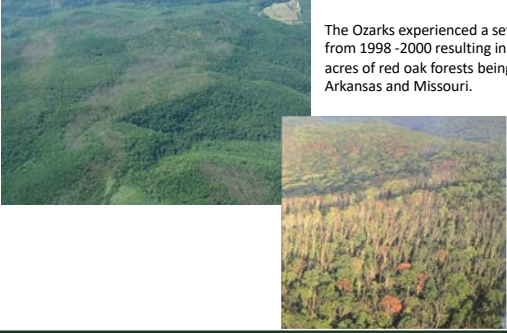
Oak Decline Factors




Contributing

- Armillaria root rot
- Hypoxylon canker
- Red oak borer
- Two-lined chestnut borer
- Bark & ambrosia beetles
- Carpenterworm



The Ozarks experienced a severe drought from 1998 -2000 resulting in over 2 million acres of red oak forests being lost in Arkansas and Missouri.





A tale of two forests...





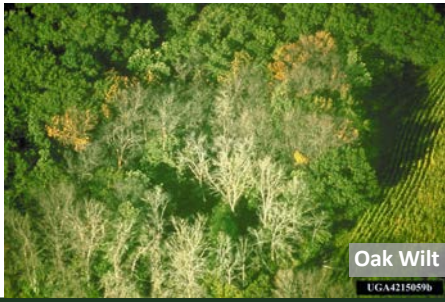
Unthinned scarlet and black oak stands on University Forest experienced mortality rates **FOUR TIMES HIGHER** than stands of similar species composition, but thinned, on Pioneer Forest!

University Forest

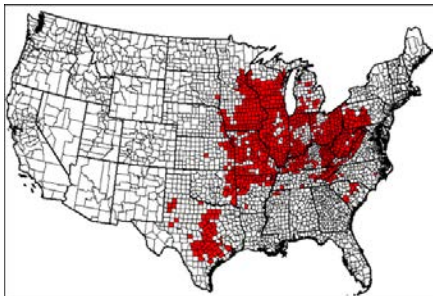
Pioneer Forest



Forest management! It matters.



Oak Wilt Distribution



Oak Wilt

- Fungal disease: *Ceratocystis fagacearum*
- Lethal disease (systemic)
- Hosts
 - Black oak group most susceptible
 - red, black, shingle and pin oaks
 - Killed rapidly
 - White oak group more tolerant / "resistant"
 - white, bur, chinkapin and swamp oaks






UGA5038074



Oak Wilt


- Spread by bark and sap beetles attracted to
 - fungal mats
 - fresh wounds
 - stressed trees
- Spread by root grafts

http://www.oakwilt.com/images/root_graft.jpg

<http://plantdiseasehandbook.tamu.edu/files/2011/06/Santation3.jpg>

<http://dickinsond.org/uploads/1/4/5/0/14501976/1349451.png?714>



Oak Wilt

Symptoms

- Dull green appearance of wilted leaves
 - Flagging
- Wilted leaves curl or brown
 - Browning (necrosis) starts at leaf margin
 - Base of leaf remains green
- Defoliation may be delayed for weeks
- Sapwood has dark streaking






Oak wilt... A good reason to burn firewood in ONE season




If caught early, you can make a silk purse out of a sow's ear...by making a group opening



Rapid White Oak Mortality



RWOM

- Trees
 - Mostly white oak
 - Wide age range (45-120)
 - 10-18" DBH most often
 - Some healthy trees remain
- Stands
 - Managed and unmanaged
 - Density not a factor?



RWOM

- Locations
 - Lower slopes
 - Drainages & seasonal streams
- Soils
 - Worse on slightly acidic backslopes
 - ≥30% clay = less mortality

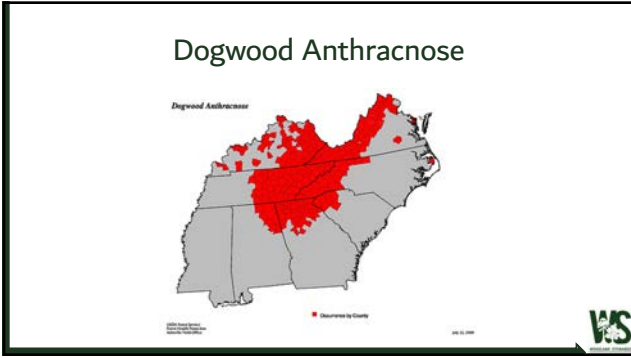




Dogwood Anthracnose

- Caused by the fungus *Discula destructiva*.
- First reported in the northern United States about 25 years ago and has been slowly moving south.
- The origin is unknown at this time
 - Was the fungus introduced?
 - Did a change in environmental conditions give this fungus the right conditions to become a significant forest health issue?









Invasive plants cannot be ignored...



To the untrained eye, they can create lush, green landscapes that appear to be flourishing and healthy ecosystems.

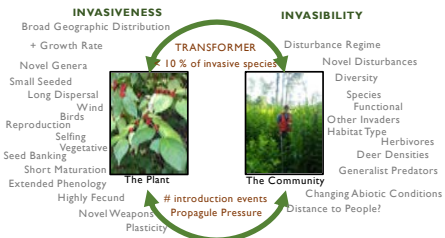


However...

- Numerous studies have shown **reduced** abundance and diversity of flora and fauna
- Can fundamentally **alter the function** of ecological communities
- Can **transform habitats** (forests can change to shrublands → shrublands to grasslands)
- Significantly **degrade** the short and long term **value of timberlands**



PLANT INVASION



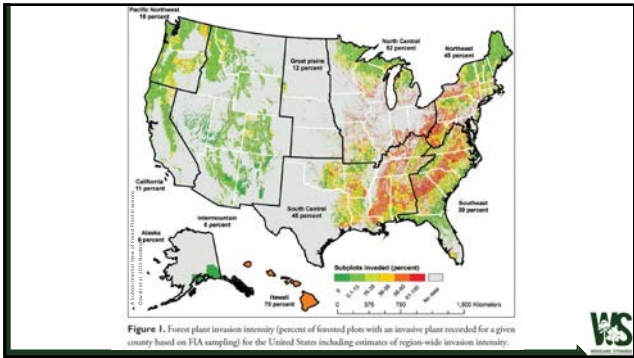




Figure 1. Forest plant invasion intensity (percent of forested plots with an invasive plant recorded for a given county based on FIA sampling) for the United States including estimates of region-wide invasion intensity.

Challenges




Climate change will continue to affect the distribution and ecological dynamics of forest communities



(some) Forest management (i.e., disturbance) can increase invasion risk

The Forestry Chronicle (2014)



Management is highly context dependent (plant, ecosystem, disturbance regime, etc.)

A call to silviculturists for a new field of science: The forestry of invasive alien species


by Terrence Sizer

ABSTRACT: A new field of forestry science is required to assess the responsibility that a new European regulation will place on landowners. Future forest disturbance needs to share and improve scientific knowledge on the management of invasive tree species above all other types.

Keywords: Invasive alien species, Ecological invasions, alien tree species, forest disturbance, North America

Invasional Meltdown

“The invasion (presence) by one invasive species in an ecosystem facilitates the invasion by additional species, increasing survival and ecological impact.” (Simberloff and Van Holle 1999)



One invading species... Multiple invading species!



Invasive Tree Examples

Tree-of-Heaven (or stink tree)

- Leaves – pinnately compound with 10-41 leaflets
- Resembles native sumac, hickory, and black walnut
- Large clusters of flowers in early summer (on female trees)
- Single winged seeds dispersed by wind or water

Chinese tallow (or popcorn tree)

- Leaves – heart-shaped with a long, pointed tip
- Yellowish flowers from April to June
- Fruit are three lobed and mature to black, opening to reveal three white-waxed covered seeds (popcorn)
- Dispersed by birds

SHARED TRAITS

- Rapid growth
- Small trees
- Soil stored seeds (~5 years)
- Aggressive sprouters



Invasive Shrub Examples

Bush honeysuckles (Amur, Bella, Tartarian, Morrow's)

- Deciduous shrub (16.5 ft. tall)
- One of the first species to leaf out in the spring
- Depending on species, flowers can be white, to pink, to red
- Berries mature to orange and red

Privets (Chinese, Japanese, Glossy)

- Semi-evergreen shrub (20 ft. tall)
- White to cream flowers from April to June
- Fruit ripens from green, to dark purple, to black
- Bird dispersed
- Seeds are short-lived in the soil (~ 1 year)

SHARED TRAITS

- Form dense understories
- Opposite leaf arrangement
- Bird dispersed
- Fruits persist into winter

Invasive forb Examples

Garlic mustard

Sericea lespedeza

Invasive forb Examples

Garlic mustard

- Herbaceous, biennial forb with two forms:
 - First year basal rosettes (heart-shaped leaves)
 - Second year bolts and flowers (leaves more triangular and strongly toothed)
- Garlic odor
- Highly tolerant of shaded environments

Sericea lespedeza

- Upright, semi-woody forb reaching heights of 3-6 ft.
- Leaves are alternate with three leaflets (resembling a turkey foot) with a bristle tip
- Seeds are numerous and can persist for decades in the soil

Invasive grass Examples



Invasive grass Examples

Japanese stiltgrass (Nepalese browntop)

- Dense, mat-forming, annual grass
- 0.5 to 3 ft. tall
- Off-center veins and thin seed heads
- Grows in floodplains, roadsides and along trails

Cogongrass

- Colony forming, dense & erect, perennial grass
- 1 to 6 ft. tall
- Off-center mid vein and finely saw toothed margins
- Silver-plumed flowers and seed heads in the spring



Some strategies for helping your woodland remain healthy...



Conduct regular walks



Minimize predisposing factors



Minimize predisposing factors



Weed your woodland garden



Manage Invasives!

- Prioritize removal of fruiting/mature individuals!
- Reduce the spread – clean equipment, target new populations, educate users
- Lots of resources available for herbicide applications – always best to call an expert
- One treatment is never enough...
- Manage the ecological community as a whole, not just the invasive species



Questions?

Please type your questions into the chat window