

Woodland Stewards Webinar Series

Session 3: Identifying and Managing Woodland Threats

Audio starts at 7PM Eastern (6PM Central)

(Please go to Tools>Audio>Audio Setup Wizard to ensure audio is correctly set)

To view only the presentation slides

(Please go to the menu "View" and uncheck the sidebar)



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
US

Dr. Hank Stelzer



M Extension
University of Missouri

WS **WOODLAND STEWARDS**
A Regional Extension Program for Landowners

Learning Outcomes

At the end of this evening, you will:

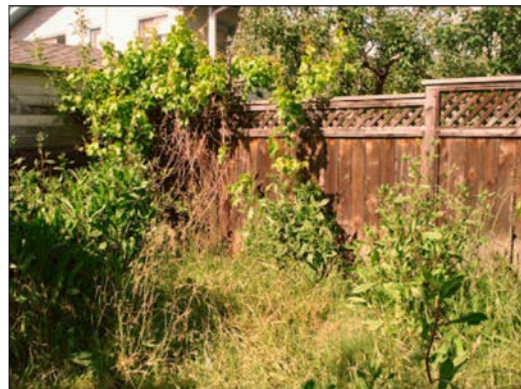
- Have learned a few, simple pest population dynamic principles
- Have an appreciation for how those principles play out in a few representative pest scenarios (insect, disease, and invasive plant)
- Understand why good forest management is key to a healthy woodland



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





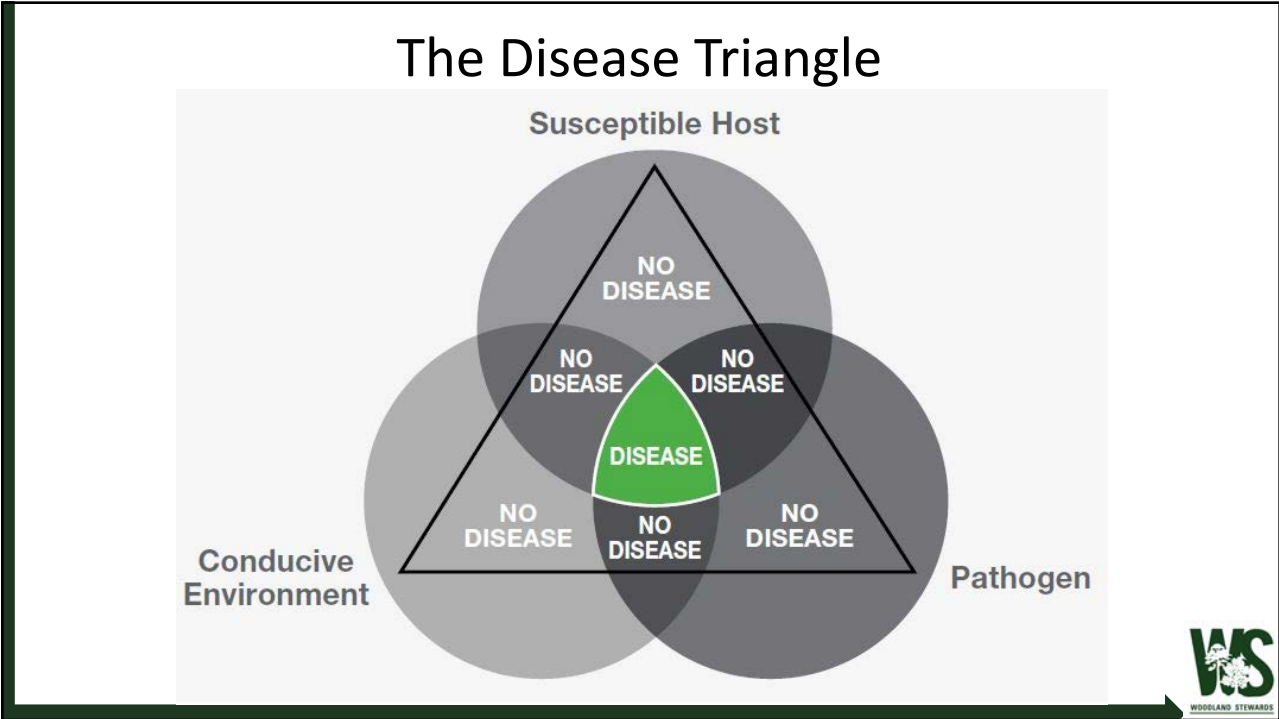
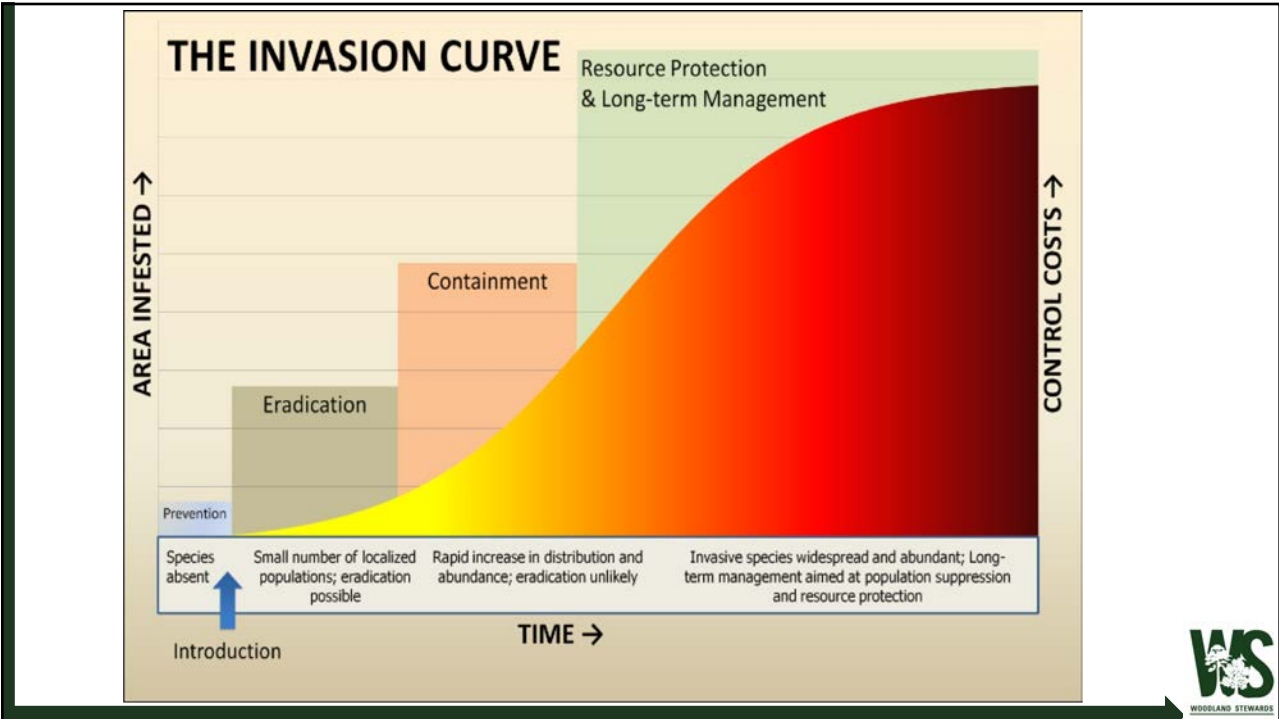


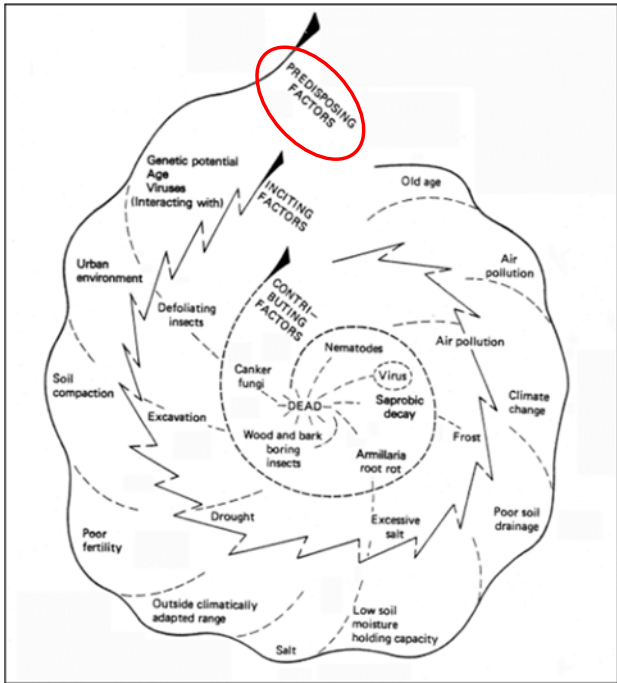




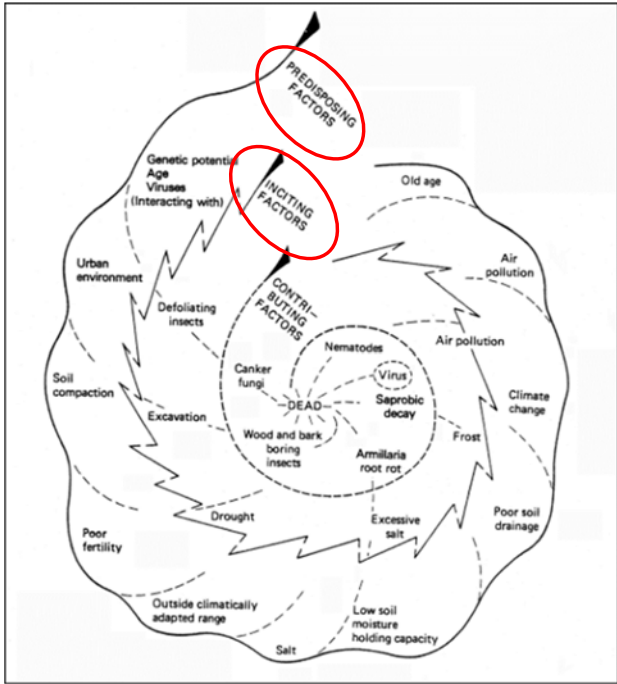
A few pest principles...





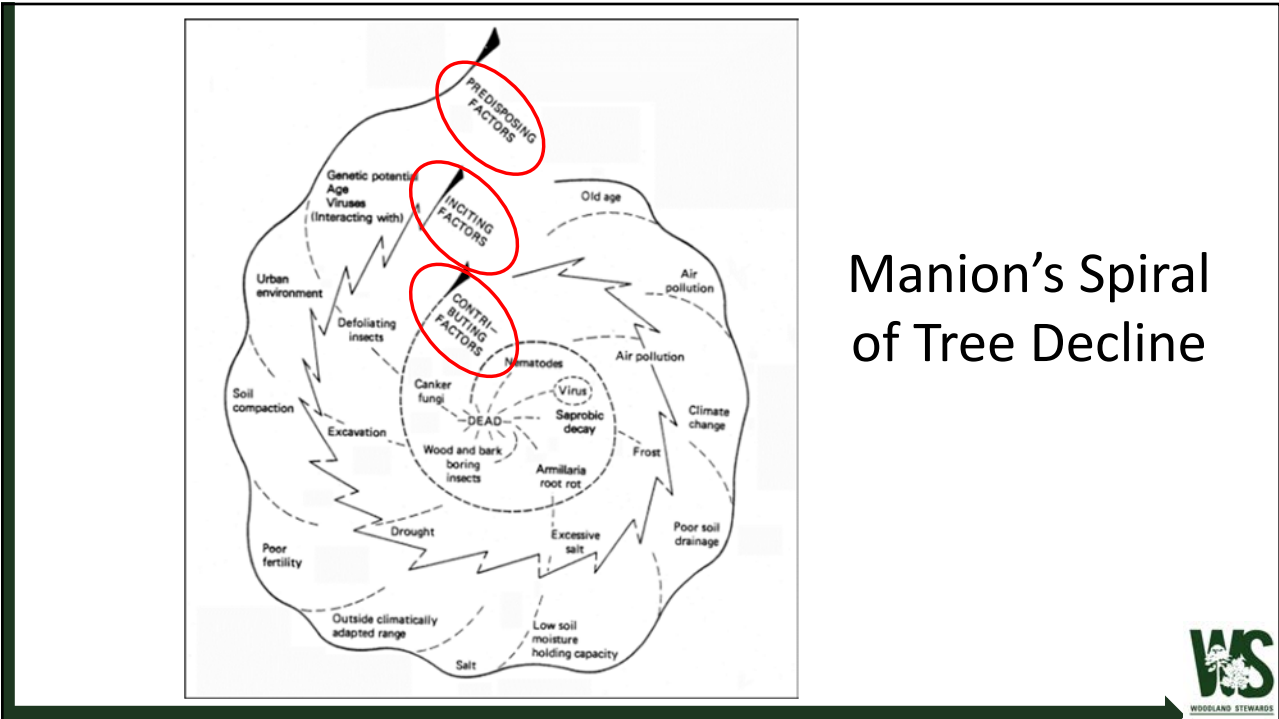


Manion's Spiral of Tree Decline



Manion's Spiral of Tree Decline





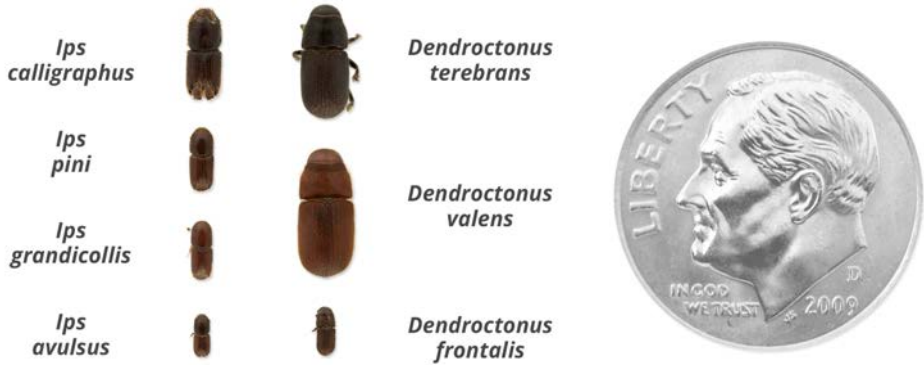
Manion's Spiral of Tree Decline

Common insect pests of southern forests



Common insect pests of southern forests

Bark beetles



Photos by D. Coyle & L. Costa, SREF



Common insect pests of southern forests

Ambrosia beetles



Photos by J. Hulcr, UF Entomology



Common insect pests of southern forests

Defoliators

Gypsy moth



<http://browpicz.pw/>



<https://www.poulin.ca/>

Forest tent caterpillar



Common insect pests of southern forests

Defoliators



Gypsy moth



<http://browpicz.pw/>



<https://www.poulin.ca/>

MATT BERTONE 2017
Forest tent caterpillar



Question: How much does forest management impact forest health?



Forest management!
It matters.



© MATT BERTONE 2014



Southern pine beetle (*Dendroctonus frontalis*)

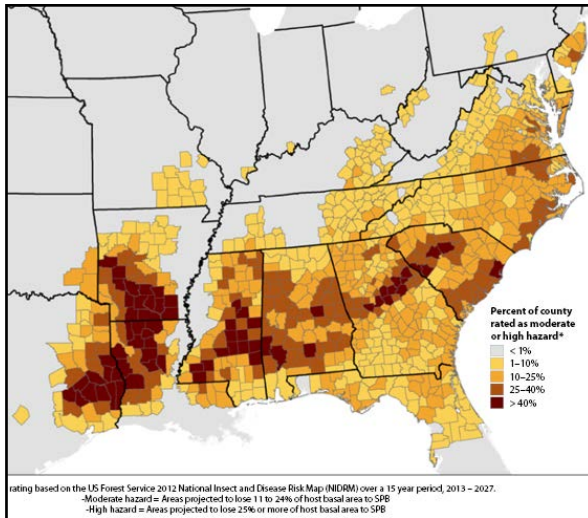
Native to North & Central America



Southern pine beetle

Attack weakened, damaged, or dying trees

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





Adult attacks tree

Southern pine beetle

Mass attack & Pitch tubes



S-shaped galleries

Southern pine beetle

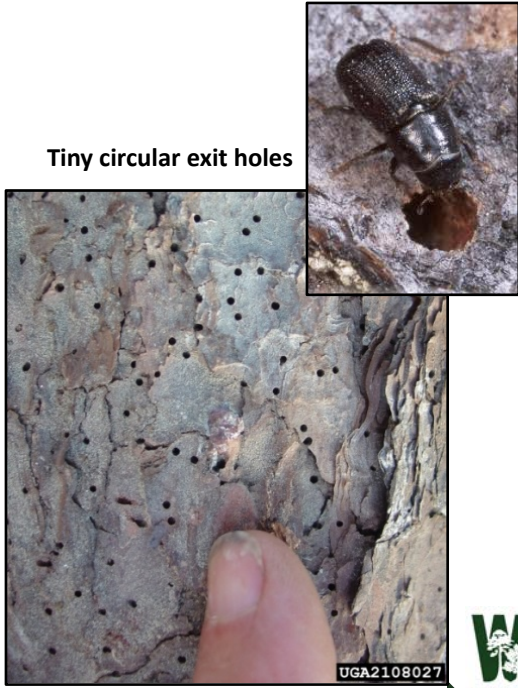
Larvae feed on phloem



Southern pine beetle



Blue stain fungi



Tiny circular exit holes



High hazard stand



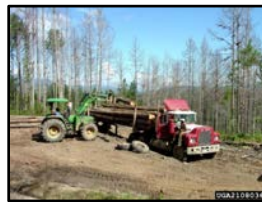
Low hazard stand



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

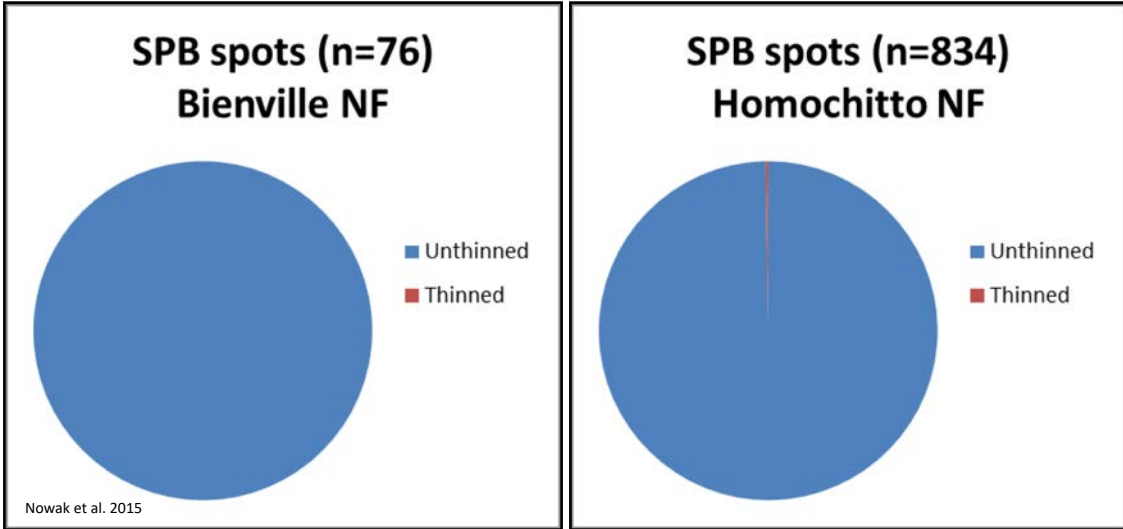
Southern Pine Beetle Infestations in Relation to Forest Stand Conditions, Previous Thinning, and Prescribed Burning: Evaluation of the Southern Pine Beetle Prevention Program

John T. Nowak, James R. Meeker, David R. Coyle,
Chris A. Steiner, and Cavell Brownie

2015, Journal of Forestry 113: 454-462.



SPB spots were more common in unthinned stands







Forest management!
It doesn't matter.



© MATT BERTONE 2017



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

Toledo, Ohio



2006 (Before EAB)


2009 (After EAB)

Credit: Dan Herms, Ohio State University



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

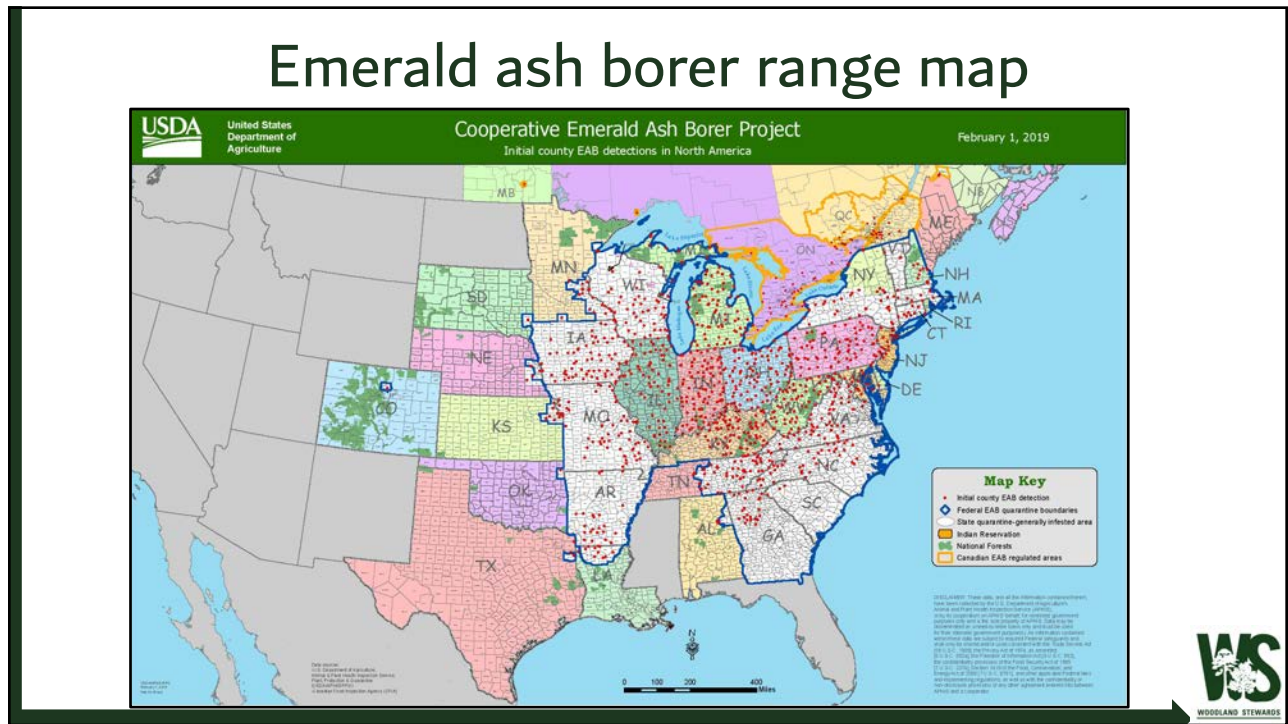
to Ohio



Millions of trees. Billions of dollars.



2006 (Before EAB) 2009 (After EAB)



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



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

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Adults feed on foliage



Emerald ash borer life cycle



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without food



April-June



Adults feed on foliage



Eggs hatch in
1-2 weeks



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



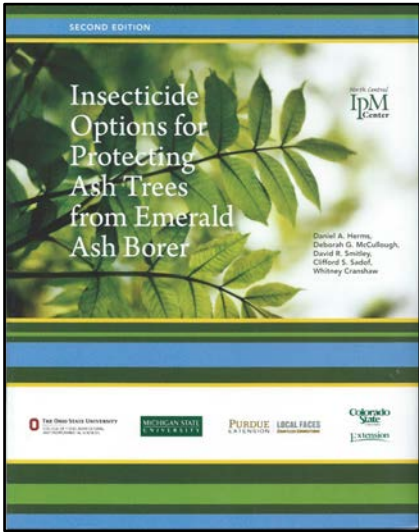
Emerald ash borer management



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



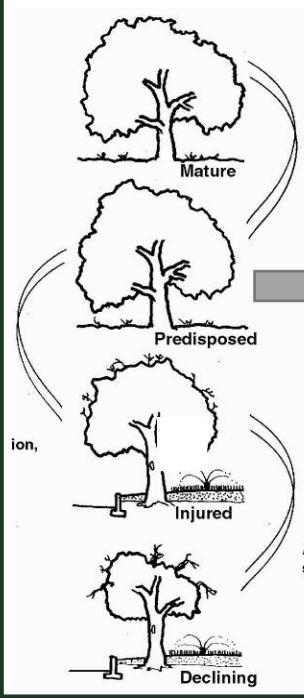
Time to take a break!



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Forest management! It matters.



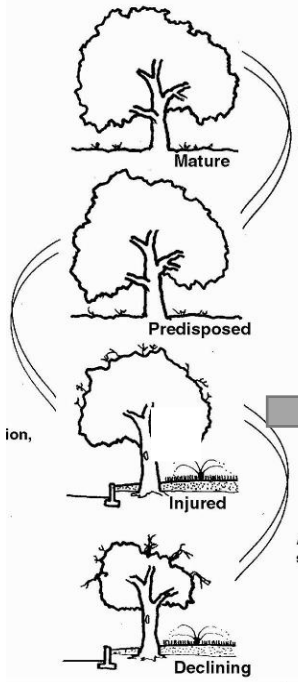
Oak Decline Factors

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



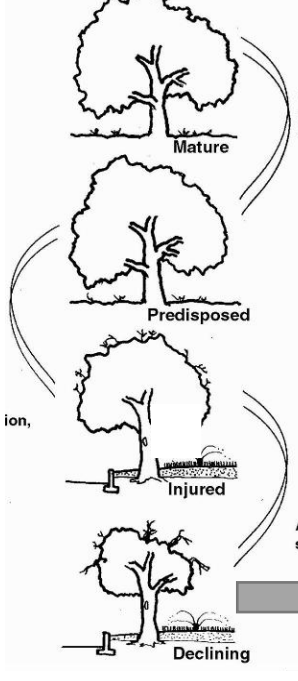
The diagram shows four stages of oak decline: 1. Mature: A healthy tree with a full canopy. 2. Predisposed: A tree with a slightly smaller canopy. 3. Injured: A tree with a significantly reduced canopy and a small area of damage at the base. 4. Declining: A tree with a very sparse canopy and extensive damage at the base. Arrows indicate a progression from Mature to Declining, with a large arrow pointing from the Injured stage to the text.

Inciting

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





Oak Decline Factors




The diagram shows four stages of oak decline: 1. Mature: A healthy tree with a full canopy. 2. Predisposed: A tree with a slightly smaller canopy. 3. Injured: A tree with a significantly reduced canopy and a small area of damage at the base. 4. Declining: A tree with a very sparse canopy and extensive damage at the base. Arrows indicate a progression from Mature to Declining, with a large arrow pointing from the Injured stage to the text.

Contributing

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



UGA0014058





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...





University Forest

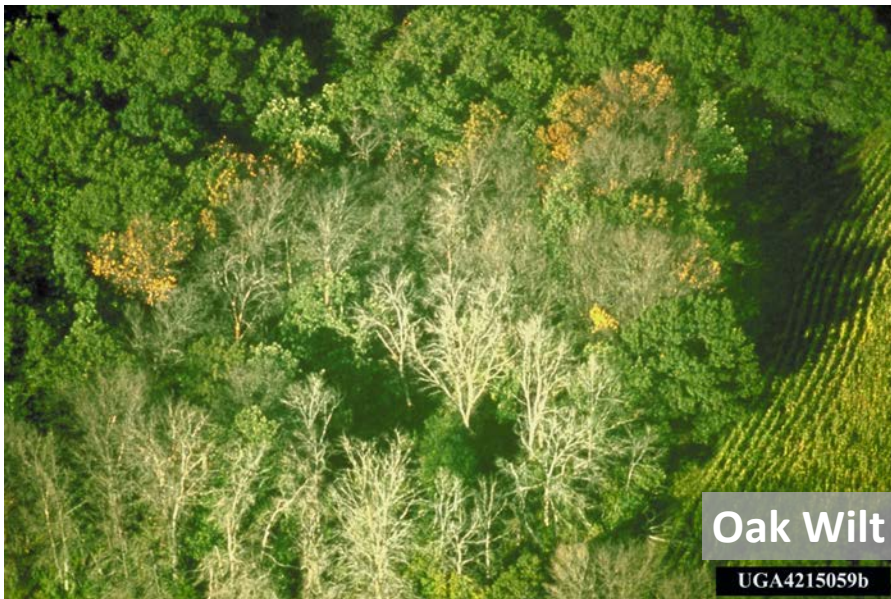
Unthinned scarlet and black oak stands on University Forest experienced mortality rates **FOUR TIMES HIGHER** than stands of similar species composition, but thinned, on Pioneer Forest!



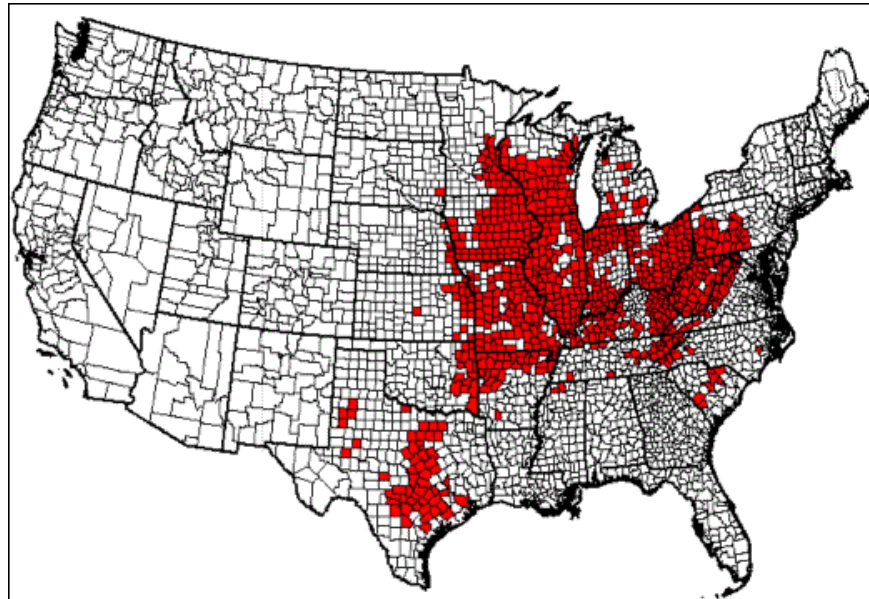
Pioneer Forest



Forest management! It matters.



Oak Wilt Distribution



UGA5038074

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

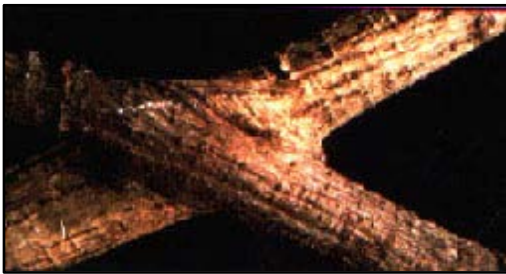


Oak Wilt

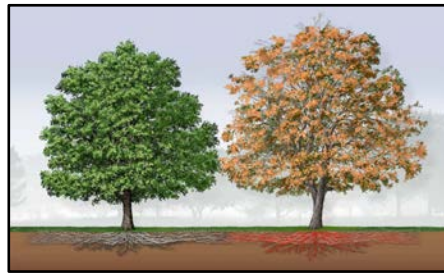
- Spread by bark and sap beetles attracted to
 - fungal mats
 - fresh wounds
 - stressed trees
- Spread by root grafts



<http://plantdiseasehandbook.tamu.edu/files/2011/06/Sanitation3.jpg>



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



<http://dickinsoncd.org/uploads/3/4/5/0/34501976/1349451.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



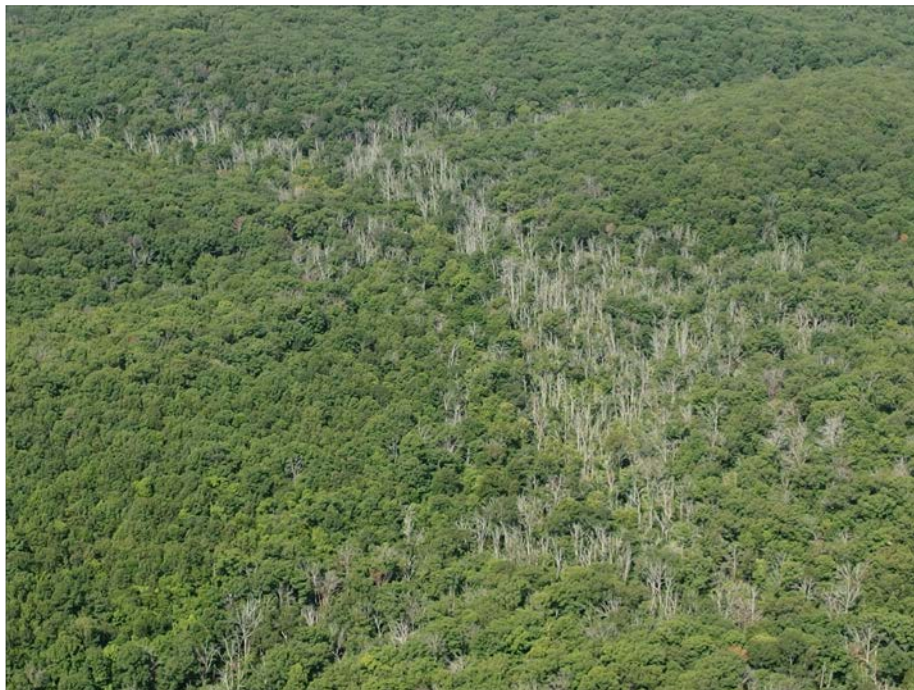
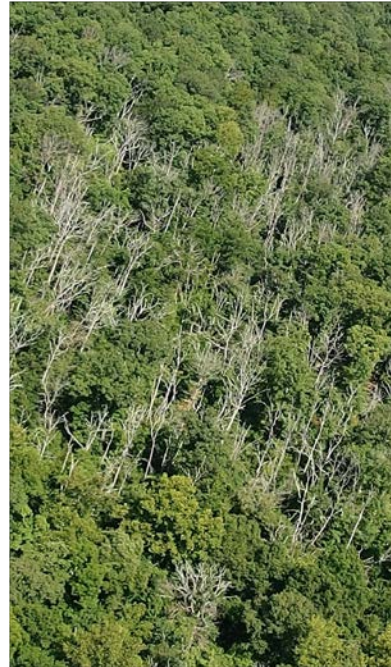
RWOM

- 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
 - $\geq 30\%$ clay = less mortality

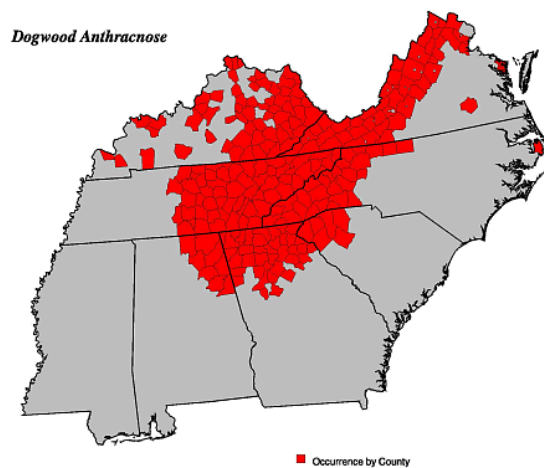


Dogwood Anthracnose

- 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 was introduced?
 - Did a change in environmental conditions give this fungus the right conditions to become a significant forest health issue?



Dogwood Anthracnose



USDA Forest Service
Forest Health Protection
Asheville Field Office

July 25, 2000



Dogwood Anthracnose



Tan disease spots on leaves.
credit: fs.fed.us



Disease spots on petals
credit: forestpest.org



Canker under the bark.
credit: forestryimages.org



Invasive plants



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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**



UGA2188036



UGA0002156



PLANT INVASION

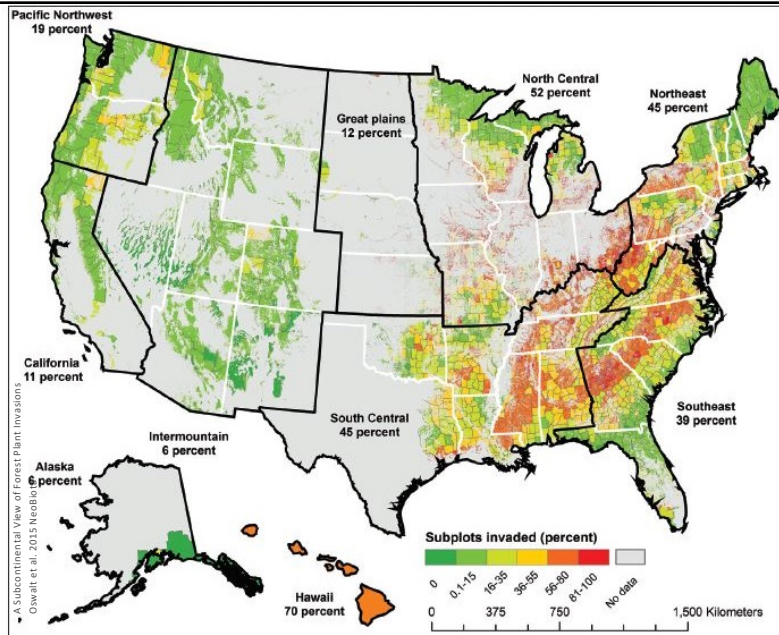
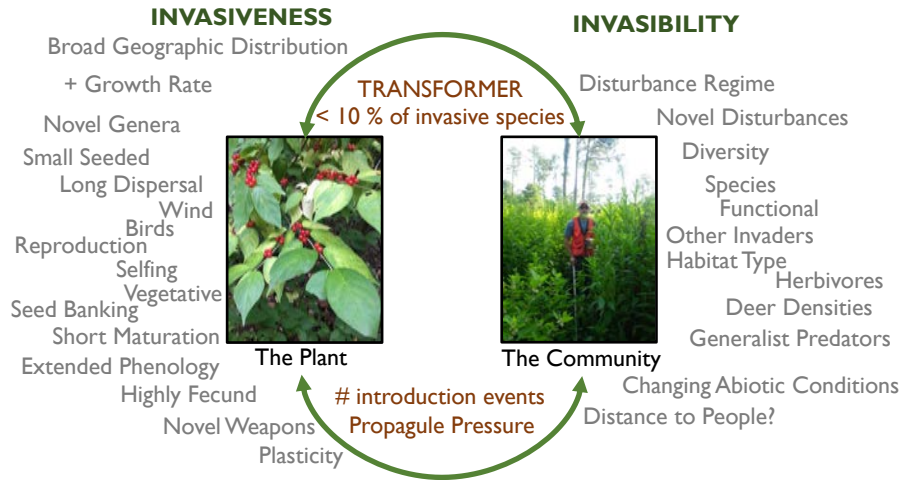
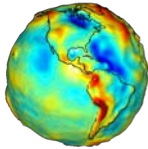


Figure 1. Forest plant invasion intensity (percent of forested plots with an invasive plant recorded for a given county based on FIA sampling) for the United States including estimates of region-wide invasion intensity.



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



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

The Forestry Chronicle (2014)

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

by Tommaso Sitzia¹

ABSTRACT

A new field of forestry science is required to assume the responsibilities that a new European regulation will give to Member States. Are silviculturists ready to share and improve scientific knowledge on the management of invasive tree species alien to Europe?

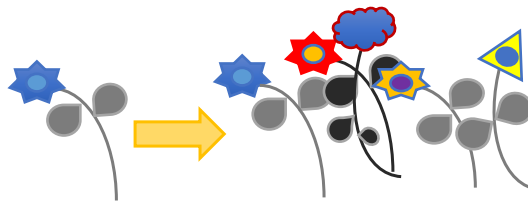
Keywords: biodiversity conservation, biological invasion, alien tree species, land abandonment, black locust



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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!



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Invasive Tree Examples



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

SHARED TRAITS

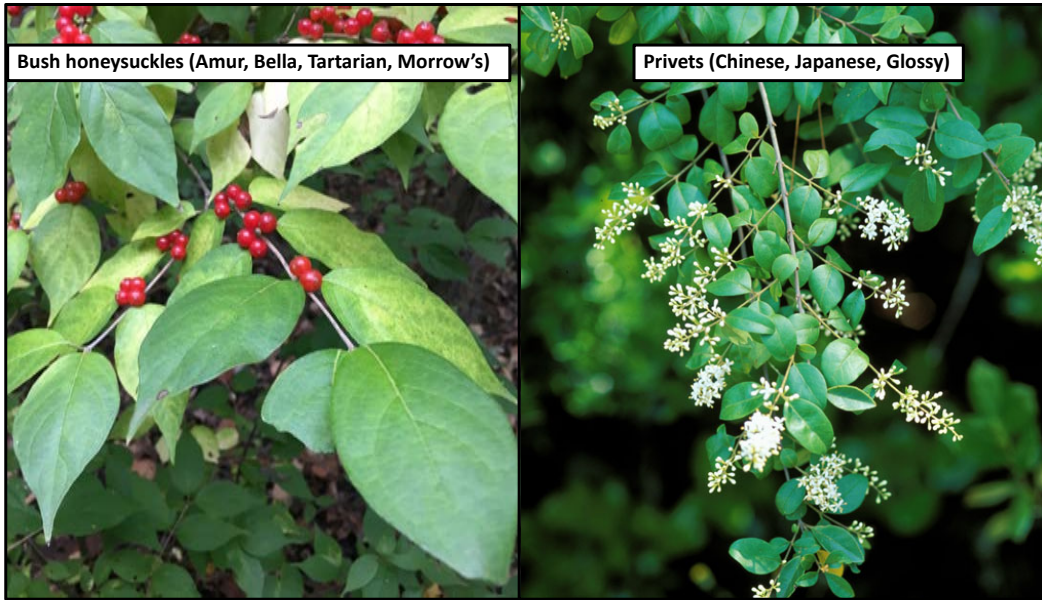
- Rapid growth
- Small trees
- Soil stored seeds (~5 years)
- Aggressive sprouters

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



Invasive Shrub Examples



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

Privets (Chinese, Japanese, Glossy)



Invasive Shrub Examples

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

Privets (Chinese, Japanese, Glossy)

SHARED TRAITS

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

- 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


- 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)



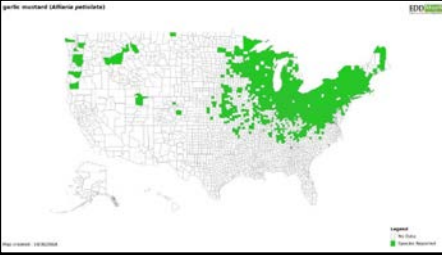
Invasive forb Examples



Invasive forb Examples




Garlic mustard

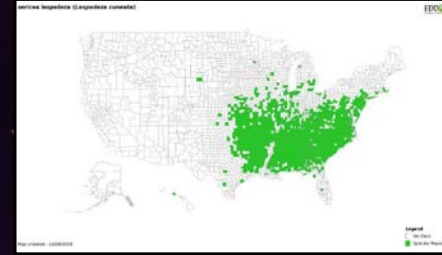


Alliaria petiolata (Alliaria petiolata)

- 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



Sericea lespedeza (Lespedeza cuneata)

- 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



Japanese stiltgrass (Nepalese browntop)



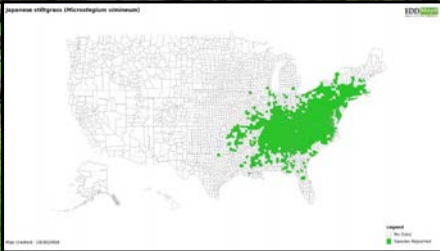
Cogongrass



Invasive grass Examples

A photograph showing a dense carpet of Japanese stiltgrass (Nepalese browntop) in a wooded area. The grass is a vibrant green and covers the ground completely. In the background, several tree trunks are visible.

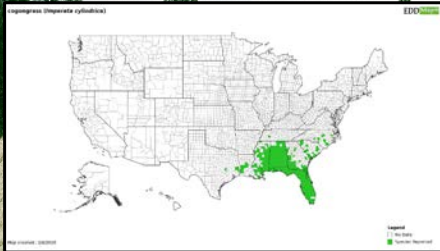
Japanese stiltgrass (Nepalese browntop)



- 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

A photograph of a large field of Cogongrass. The grass has long, feathery, white seed heads that are blowing in the wind. The field is surrounded by a line of trees in the background.

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



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