Hardwood Forest Management for Health & Productivity

Wayne K. Clatterbuck
Forestry, Wildlife & Fisheries
University of Tennessee

Forest Health Webinar
Southern Regional Extension Forestry
November 1, 2017

Presentation Outline

- Introduce Clatterbuck
- What is a Healthy Forest?
- Healthy Forest Components
  - Capacity for Renewal
  - Resiliency
  - Meet Future Desires
- Common Conditions in Unmanaged Hdwd. Stands
- Promote Stand Resistance through Management
- Control Invasives
- Take Home Messages

Healthy Forests Defined

Ability of the forest to sustain itself ecologically and provide what society desires and needs

Healthy Forests

Ecologically

A healthy forest retains its unique species and processes, while maintaining its structure, composition, and function

Healthy Forests

Socially

A healthy forest has the ability to accommodate current and future needs of people for values, products and services

Healthy Forests

Ecology and social aspects are inter-related

Forests cannot meet social needs without possessing the sustained capacity to grow, reproduce, recycle nutrients and carry other ecological functions

Indicators of a Healthy Forest

1. Capacity of renewal
2. Resilient
3. Meets current & future desires/uses

Capacity for Renewal

What is Resiliency?

The ability for a forest to eventually return to a similar state after a disturbance causes a short-term change

Disturbances are frequent on the landscape:

Wind, fire, insects/disease, logging, ice storms, non-native species

Resilient Forests

1. Diversity of species 

Resilient Forests

1. Diversity of species
2. Maintain vigorous trees 

Resilient Forests

1. Diversity of species
2. Maintain vigorous trees
3. Avoid too many mature to overmature trees and vice versa

Resilient Forests

1. Diversity of species
2. Maintain vigorous trees
3. Avoid too many mature to overmature trees and vice versa
4. Alleviate overcrowding

Meets Current and Future Desires/Uses

Common Conditions in Hardwood Stands

- Aging and Declining Hardwood Forests
- Non-native Invasive Species
- Overstocked
- Species Off-site or Undesired Species
- Excessive Midstory Vegetation
- Excessive Fuels
- High-graded Stands w/o Regard to the Future --- Disturbed Stands

Promote Stand Resistance

MANAGE:

- Thin dense or stagnant stands
- Mix pine and hardwood species
- Minimize logging damage
- Regenerate mature and overmature stands
- Control invasives
- Climate variability

Managing

- Sunlight
- Density
- Matching Species to Sites

Promote Stand Resistance

- Thin dense or stagnant stands
- Mix pine and hardwood
- Minimize logging damage
- Regenerate overmature stands
- Control invasives

Promote Stand Resistance

Thin Dense or Stagnant (Low Vigor) Stands

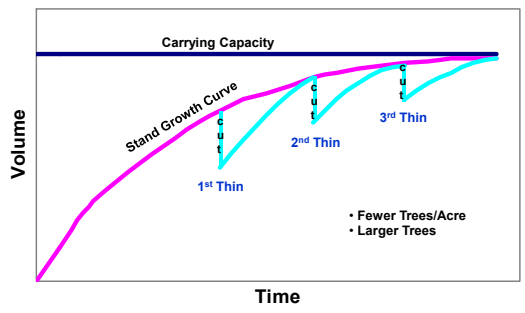

DEC 23 2004


Midstory Removal

Thinning

- Reduced crowding through altering the environment (physical space and sunlight received) of the remaining trees
- By redistributing growth potential to the most desirable trees, the overall health, vigor and growth of the stand is increased

Thinning



Average Stems per Acre

6 inches	200-340 trees
8 inches	140-240 trees
10 inches	90-150 trees
12 inches	70-115 trees
14 inches	50-90 trees
18 inches	35-60 trees
20 inches	30-50 trees

When to Thin?

- **Closed Canopy** --- when adjacent tree crowns begin to overlap
- **Live Crown Ratios** --- are less than 33 percent
- **Diameter Growth Rates** begin to decrease

What to Thin?

- Unwanted Species
- Poor Form
- Slow Growth

More Healthy Trees in the Forest!

Promote Stand Resistance

Promote Mixed Pine – Hardwood Stands

Creation of Mixed Pine-Hardwood Stands

- History
- Transitional community type
- Pine seed source is absent in maturing hardwoods
- Disturbance dependent
- Similar site characteristics on average sites --- pine and oak
- Methods
  - a. Cluster planting pine within hardwoods
  - b. Planted pine at wide spacings w/I hdwd clearcut

Promote Stand Resistance

Minimize Logging Damage

Promote Stand Resistance

Regenerate Overmature Stands

Promote Stand Resistance

Control Invasives

Invasive/Exotic Species
(Definition)

Any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem; and whose introduction does or is likely to cause economic or environmental harm or harm to human health.

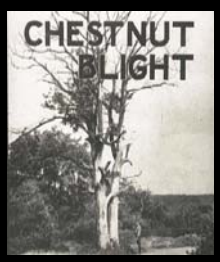
Invasive Species Impacts

- Biodiversity
- Ecosystem Function
- Economies
- Aesthetics
- Human Health

Well-Known Invasive Species

Dutch elm disease

Chestnut blight



Current Status

- Approximately **7,000 exotic species** are established in the United States
- Less than **600 species** causing some form of ecological harm
- Approximately **152 threats** in Tennessee from invasive/exotic insects, disease, and plants

Major Forest Health Issues in the Southern United States

- Oak Decline
- Gypsy Moth
- Southern Pine Beetle
- Hemlock Woolly Adelgid
- Emerald Ash Borer (EAB)
- Thousand Canker Disease of Walnut (TCD)

Other Potential Concerns

- Sirex Woodwasp
- Asian Longhorned Beetle
- Sudden Oak Death
- Cogongrass
- Variety of plant species *(to name a few)*
  - Tree of heaven
  - Kudzu
  - Nepalese browntop (Microstegium)

Invasive Species

How Did They Get Here?

How Did They Get Here?

Accidental Introduction


Packing Material Contaminant


Crop Contaminant

Intentional Introductions

Ornamental

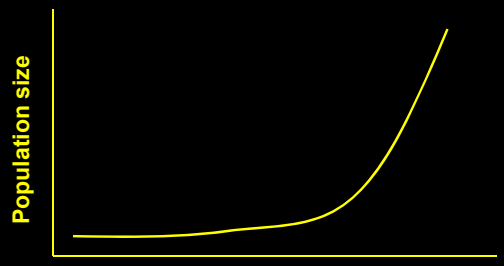
Intentional Introductions

Wildlife

Intentional Introductions

Erosion Control

Lag Phase



Current Occupation in Forests and Forest Openings and Edges in 12 Southern States

Japanese Honeysuckle	10,300,000 acres
Privets (7 species)	3,200,000
Japanese Stiltgrass (*Microstegium*)	750,000
Non-native Roses	600,000
Tallowtree	450,000
Invasive Lespedezas	450,000
Bush Honeysuckle	350,000
Kudzu	240,000
Japanese Climbing Fern	180,000

18 Million Acres occupied by 33 Taxa

9 percent of Forested Acres

Habitat

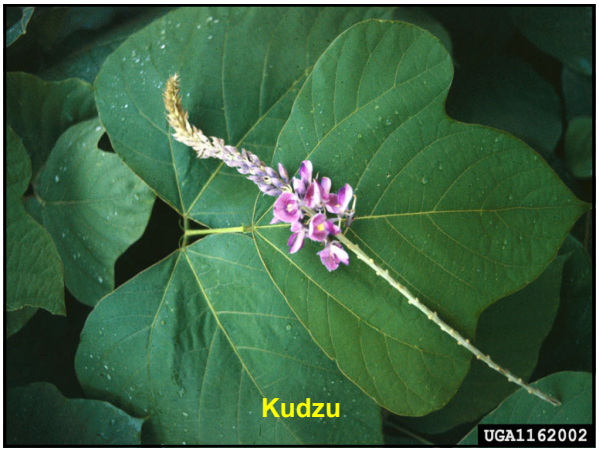
Most invasive species readily invade open disturbed habitats

- Roadsides
- Ditches
- Cut-over forests
- Fields
- Pastures
- Old-Fields
- ROWs

What Can We Do About It?

- Learn to identify invasive plants
- Anticipate responses to management as well as disturbances
- Control any escaped populations
- Do not plant/use invasive species


Chinese Privet


Kudzu
UGA1162002


Mimosa
UGA0016205

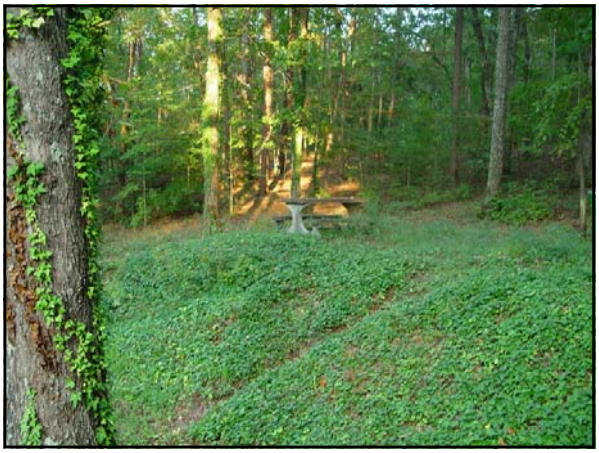

Japanese Climbing Fern


Tree of Heaven
UGA2135054


Bamboo


Tallow Tree


English Ivy
UGA0016197




Nepalese browntop or Japanese stiltgrass
Microstegium vimineum
UGA1378046


Nepalese Browntop


Miscanthus

Silvicultural Practices

- Harvesting
- Road Construction
- Site Preparation
- Tree Planting
- Intermediate Treatments
- Prescribed Fire

All Disturbances





Invasive Plant Management Programs

- Prevention
- Detection and Monitoring
- Control and Containment
- Restoration
- Research
- Education

Integrated Vegetation Management

Methods for Controlling Invasive Plants

- Mechanical
- Manually (roots?)
- Chemical --- Herbicide
- Biological Control
- Prescribed Burning (roots?)


Control a little now
or
Control a bunch later

Take Home

1. **Prevention through Management**
2. **Diversity of Species**

Take Home

3. **Active Management**

- Maintain Vigorous Trees
- Avoid Mature to Overmature, Older Trees
- Control Density or Overcrowding

Take Home

4. **Control Invasives**

Privet Fruits

Good Forest Management in Maintaining Vigorous Trees Encourages a Healthy Forest

The challenge is not to allow forest conditions that increases susceptibility to insect and disease, colonization and spread of invasive plants, and factors that may perpetuate forest decline