Forest Management Basics
"Dang. Just a thin ring of wood veneer over cheap particle board."
• Contributes $30.5 billion annually to Virginia's economy.

• Continues to support one of the largest manufacturing industries in the state, ranking first in employment, wages and salaries.

• Contributes $345 million back to Virginia landowners for selling their timber.

• Provides more than $3 billion in recreational opportunities to two-thirds of citizens.

• Generates more than 248,000 jobs.

• Generates an estimated $60 million through specialty forest products.

• Protects Virginia watersheds from erosion and sedimentation.

• Provides long-term carbon sequestration through forest management on 16 million acres of forest land, which contributes to clean air and enhances our quality of life. Carbon sequestration is the long-term storage of carbon in the terrestrial biosphere (such as trees), underground, or the oceans so that the buildup of carbon dioxide (the principal greenhouse gas) concentration in the atmosphere will reduce or slow.

• Provides important social benefits including attractive sites for homes, scenic beauty, wildlife habitat, a draw for visitors and potential new residents
Virginia Forest Facts

- Virginia has 15.72 million acres of forestland
- 62% of Virginia is forested
- Hardwood forests make up 79% of Virginia forestland
- Net annual growth of hardwood timber volume is 2.8%/year while annual removals average 2.2%
Now let's begin our training session ..
Forest Management

- Begins with:
  - A plan

- Implemented with:
  - Best Management Practices
  - Sound Silviculture
  - Professional assistance (when appropriate)

- Continues with:
  - One generation of satisfied owners passing the property to the next stewards
Forest Management

Economic
Demand, proximity, time, labor, skills, $ & capital invest., etc.

Biological/Ecological
soils, history, silvics, stand development, topography, rainfall, existing flora & fauna, etc.

Social
Federal & state laws, local ordinances, public perception, etc.

Challenge
Silvics are the biological characteristics of individual trees, such as...

- Natural range
- Shade tolerance
- Place in succession
- Regeneration characteristics
  - seedbed requirements
  - seed dispersal
  - germination requirements
- Growth form
- Longevity
Forest Types

- Pine
- Coastal Plain, Piedmont, and Blue Ridge

Common species:
- Loblolly
- Pitch
- Longleaf
- Virginia
- White Pine
Forest Types

- Pine hardwood
- Piedmont, Blue Ridge, Ridge and Valley
- Common species:
  - Shortleaf Pine
  - Table mountain Pine
  - Virginia Pine
  - Oak spp.
  - Hickory spp.
Forest Types

- Mixed Hardwood
- Blue Ridge, Ridge and Valley, Piedmont, Mountain
- Common species:
  - Oak spp.
  - Hickory spp.
  - Maple
  - Black gum
  - Other misc. hardwoods
Forest Types

- Bottomland hardwood
- Coastal Plain, some Piedmont
- Common species
  - Ash
  - Sycamore
  - Swamp White Oak
  - Swamp Chestnut Oak
  - Black Walnut
Forest Types

- Swamp hardwoods
- Coastal Plain
- Common species
  - Water Tupelo
  - Bald cypress
  - Water Oak
Forest Types

- Cove Hardwoods
- Ridge and Valley
- Common species:
  - Northern Red Oak
  - Black Cherry
  - Yellow Poplar
  - White Oak
  - American Beech
  - Eastern Hemlock
- Shifts in dominant vegetation size, species, density (stocking), & longevity
- Results in changes in soil characteristics, wildlife populations, etc.
Stand Development

(succession within a forest stand)
Stand Development

- A function primarily of
  - site quality
  - Past history
  - current practices (grazing, for example)
  - species composition

A photographic history from the Allegheny Plateau in Pennsylvania
An intro to Silviculture
Biology 101 - a review

All plants need:
- space (to occupy & grow)
- sunlight (to make food)
- air (to make food)
- soil (for nutrients, support, water)
- water (to support, transport)

As managers, we can manipulate some of these needs... = SILVICULTURE!
Forest stand

A community of trees that is sufficiently uniform to be distinguished from others around it.
Performing a Stand Analysis

- Composition of stand
- Stand History
- Forest type
- Age – how old?
- Age distribution
- Growth Rate
- Size
- Trees per acre
- Quality of site
  - Site index
  - Height
  - Age
- Products available
- Reproduction
Silviculture

“The art & science of controlling the establishment, growth, composition, health and quality of forest and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis.”

The Dictionary of Forestry, 1998
Silviculture is more than just “cutting trees.”
Silver culture = Silviculture
Three Phases of a Silvicultural System

Phase:
- Regeneration
  - Natural
  - Artificial - seeding
  - Artificial - planting

- Tending
  - Release cuttings
  - Pruning
  - Thinning
  - Intermediate cuts
  - Clearcutting method
  - Shelterwood method
  - Seed-tree method
  - Selection method
  - Other partial cuts
    (Two-aged methods)

- Harvest
Pine Management

- Regeneration Method
  - Planting (artificial)
- Fast Rotation
  - 30-40 years
- Intermediate treatments
  - Thinning
    - Pulpwood
    - Income
- Harvest
  - Sawtimber, Chip n Saw
- Rinse and Repeat!
Hardwood Management

- Regeneration Method
  - Coppice or seed (Natural)
- Slower Rotation
  - 80 – 100 years
- Intermediate Treatments
  - TSI, Crop Tree Release, Thinning
  - May be some income
- Harvest
  - Sawtimber
  - Pulpwood
Intermediate Treatments

- Release
- Thinning
- Timber Stand Improvement (TSI)
Release

■ To *release* a **young** tree means to kill or cut undesirable trees or other vegetation that overtops it. Hence the term “herbicide release.”

■ Commonly used with young planted pines to free them from hardwood or grass competition.

■ Crop tree release - cutting or deadening trees in a young hardwood stand to focus growth on better growing trees of desired species and canopy position.
Commercial Thinning

- Removal of merchantable trees during the rotation.
  - To capture the value in trees that would otherwise die.
  - To concentrate the growth on fewer trees so they become bigger faster.
  - To maintain high stand vigor, thereby reducing susceptibility to insects and disease.
  - To insure good seed sources for the next rotation.
Commercial Thinning (cont.)

- To improve stand quality and value.
- To provide early income to help pay investment and operating costs.
- Can improve wildlife habitat.
- Shortens the rotation by speeding tree development.
- Can be performed in both pine and hardwood stands.
Removes trees of less desirable species, poor form, and poor condition from the main canopy to favor better trees and improve stand quality and composition.

A first step for improving degraded stands. Used primarily in hardwood stands.
Silvicultural Harvesting Methods *For Regeneration*

- **Even-aged systems**
  - Clearcut
  - Seed Tree
  - Shelterwood

- **Uneven-aged systems**
  - Group selection
  - Single-tree selection
Tree diameter vs. Age in years graph showing:

- **Regrowth**
- **Intermediate treatments**
- **Regeneration harvests**

**Stand development under even-aged management**

Even-aged Management

- Create stands with trees of similar age.
- All (almost!) trees are harvested at the same time.
- The most effective way to regenerate shade-intolerant species.
- There are three established even-aged methods: clearcutting, seed-tree, and shelterwood.
Clearcutting Method

- Removes all trees in a stand down to 2” in diameter regardless of size and species.
- Used to regenerate a forest either naturally or artificially.
- Used in both hardwood and pine stands.
- Most economical method to harvest timber.
Clear Cutting vs. Land Clearing

- Clear cutting is NOT the same as land clearing!
- A clear cut is a harvest method that sets the stage for a new forest.
- Land clearing may initially look similar, but it leads to a change in land use (e.g., development).
Number of seed trees left depends on tree height, seed characteristics, wind direction.

Usually from 3 to 15 seed trees per acre are left behind.

Seed trees should be the best trees in the stand.
This is a heavy seed tree...about 15 trees per acre.
Purpose is to obtain reproduction under the protection offered by partial cover.

Overstory trees left in place should be the best trees in the stand.

Overstory is removed in two or three stages over a 10 to 20 year period.
Uneven-aged Systems

- Contain at least three—and sometimes many more—age classes.
- Trees are harvested singly or in groups, resulting in continuous forest canopy cover.
- The most effective way to regenerate shade-tolerant species.
- Examples include single-tree selection and group selection.
Harvest groups of trees, creating openings no larger than 1 to 2 times the height of surrounding trees.
Single-Tree Selection Method

- Trees are harvested singly, distributing growing space evenly over all diameter classes.
Selective Cutting Alert

- removes the best competitors.
- removes the fastest growing individuals.
- removes the most valuable species.
- with no regard for spacing or stocking.
- with no tending of smaller diameter classes.
- with no consideration given to regenerating the future stand.
- with no consideration given to wildlife.
Selective Cutting...

a.k.a:

- Selectively cut
- Selection harvest
- Select cut
- Diameter limit
- All trees bigger than ___
- High-grading
- Leaving room for the “little young trees”
The result of high-grading is a...
Regeneration Continuum (For N.C.'s Piedmont and Coastal Plain)

Tree Species Favored by Various Harvesting Methods

**Shade Lovers**
- red maple
- silver maple
- pignut hickory
- shellbark hickory
- sugarberry
- dogwood
- persimmon
- beech
- American holly
- southern magnolia
- red bay
- black gum
- tupelo gum
- slippery elm

**Intermediate**
- Atlantic white cedar
- bald cypress
- boxelder
- sycamore
- white oak
- swamp white oak
- southern red oak
- overcup oak
- chestnut oak
- northern red oak
- black oak
- live oak
- winged elm
- water hickory
- shagbark hickory
- pumpkin ash
- sweet bay

**Sunlovers**
- eastern red cedar
- shortleaf pine
- longleaf pine
- pitch pine
- pond pine
- Virginia pine
- loblolly pine
- river birch
- bittersweet hickory
- white ash
- green ash
- sweetgum
- yellow poplar
- cottonwood
- cherrybark oak
- swamp chestnut oak
- shumard oak
- water oak
- pine oak
- post oak
- black willow
- sassafrass

Increasing Intensity of Harvest

SINGLE TREE  |  GROUP SELECTION  |  SHELTER WOOD  |  SEED TREE  |  CLEAR CUT
PARTIAL  |  COMPLETE

---

Full shade  |  Full sunlight
# Regeneration Continuum

For North Carolina's Mountains

## Tree Species Favored by Various Harvesting Methods

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<thead>
<tr>
<th>Shade Lovers</th>
<th>Intermediate</th>
<th>Sunlovers</th>
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<td>Willow</td>
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<td>Sassafrass</td>
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### Harvesting Intensity

- **Single Tree**
- **Group Selection**
  - Partial
- **Shelter Wood**
- **Seed Tree**
  - Complete
- **Clear Cut**

Increasing intensity of harvest
Silvicultural Tools
Focus on:

- **Residual Stand** – What are you leaving?
- **Future Stand** – What are you providing?
Where does the wood come from?

Ownership in Virginia

- Private – 77.6%
  - 12,236,300 acres
- National Forest – 10.7%
  - 1,692,400 acres
- Forest Industry – 4.9%
  - 763,200 acres
- Government – 6.8%
  - 1,073,800 acres
Is Timber Valuable? Depends...

Many factors influence timber prices

- Species
- Quality
- Access to the stand
- Volume within the stand
- Weather
- Consumer Aesthetic
- Landowner Objectives
- Natural Disasters
- Presence of Markets