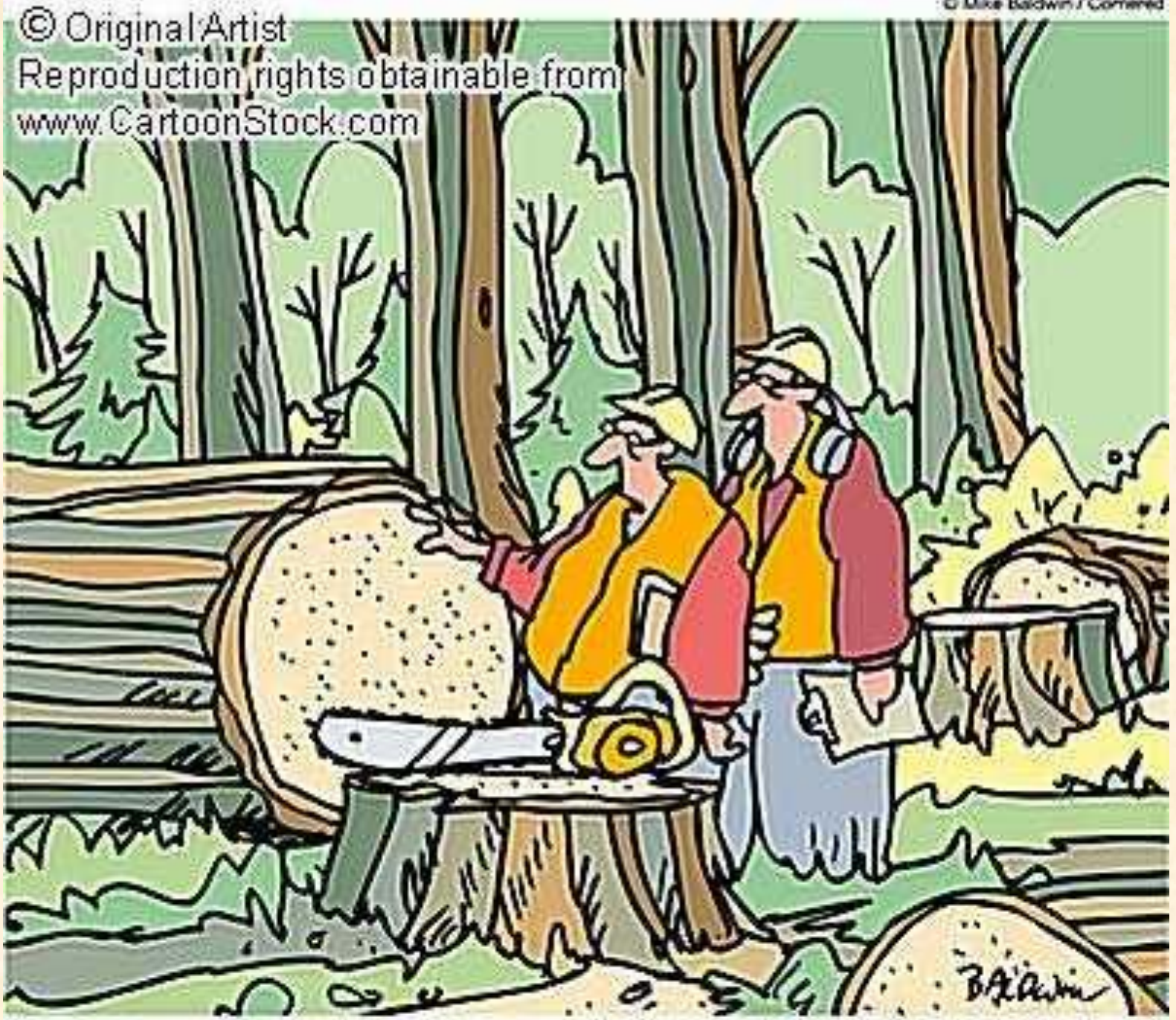
Forest Management Basics



"Dang. Just a thin ring of wood veneer over cheap particle board."

The Forest Resource of the Commonwealth:

•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

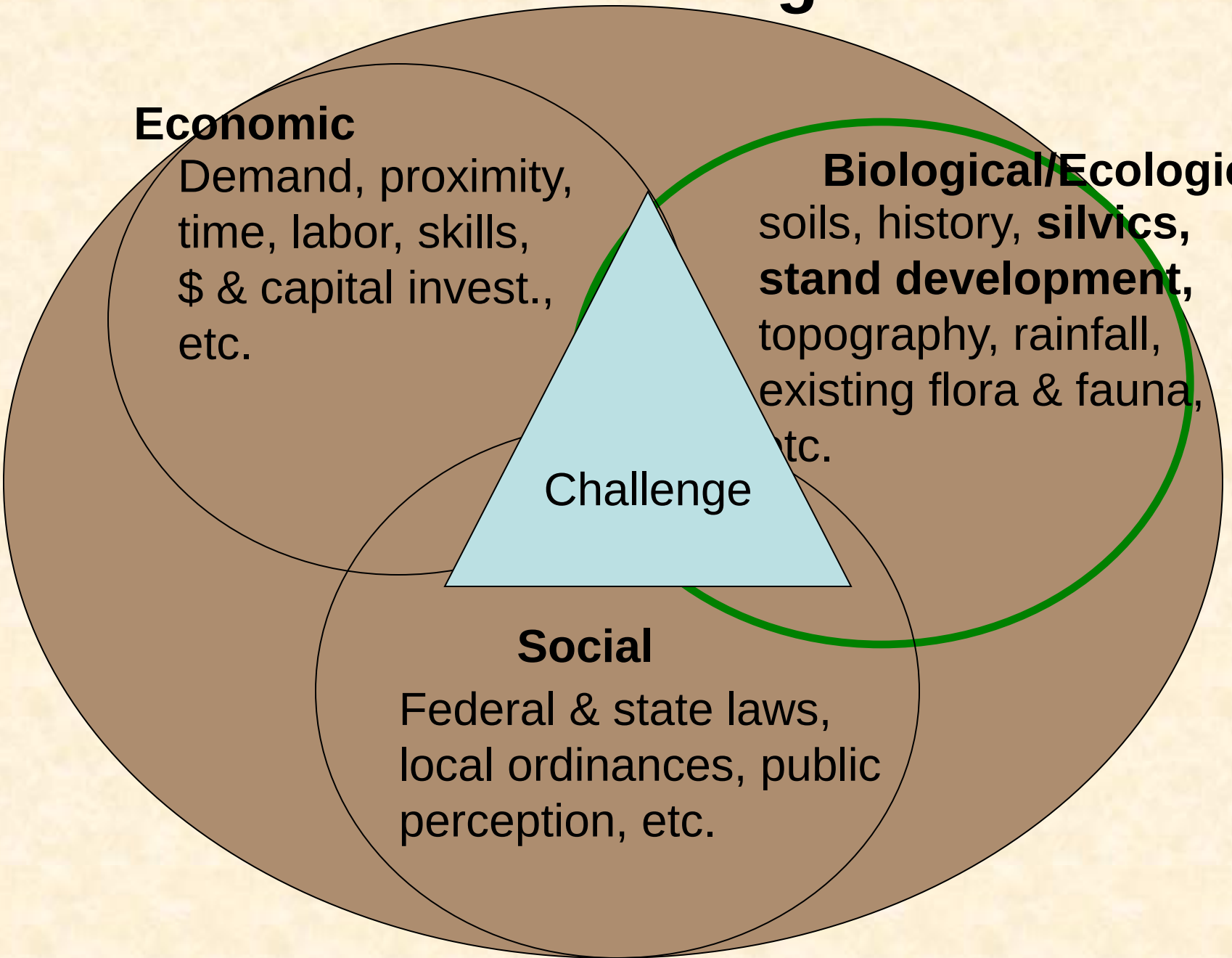
- Virginia has 15.72 million acres of forestland
- 62% of Virginia is forested
- Hardwood forests make up 79% of Virginia forestland
- Net annual growth of hardwood timber volume is 2.8%/year while annual removals average 2.2%

Now lets 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

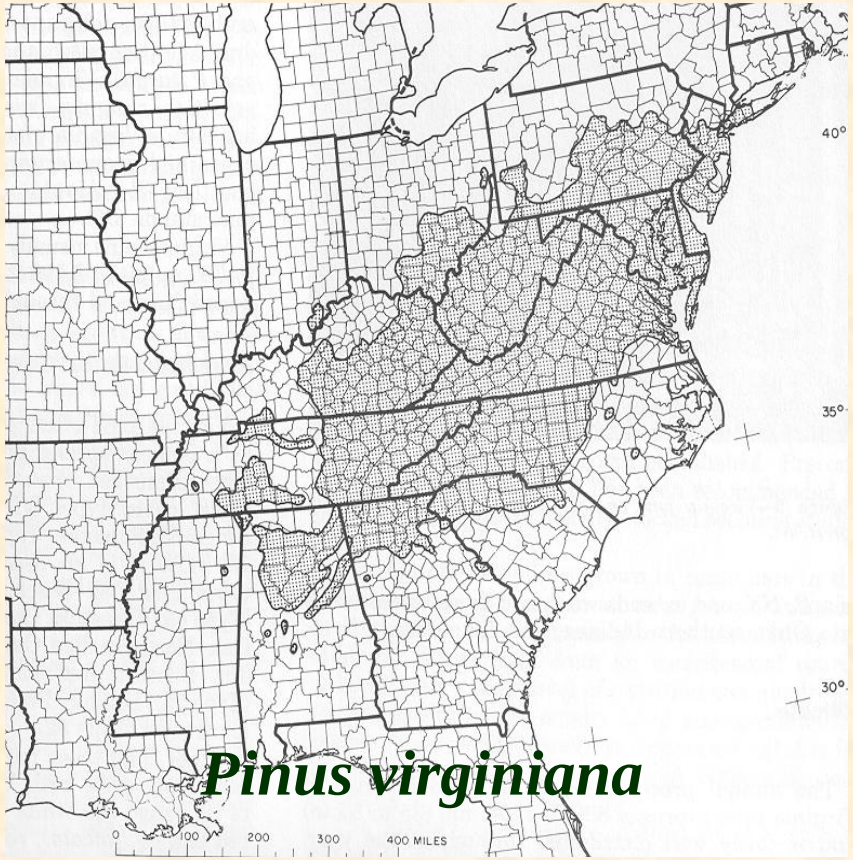
Forest Management



Silvics

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



Pinus virginiana

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

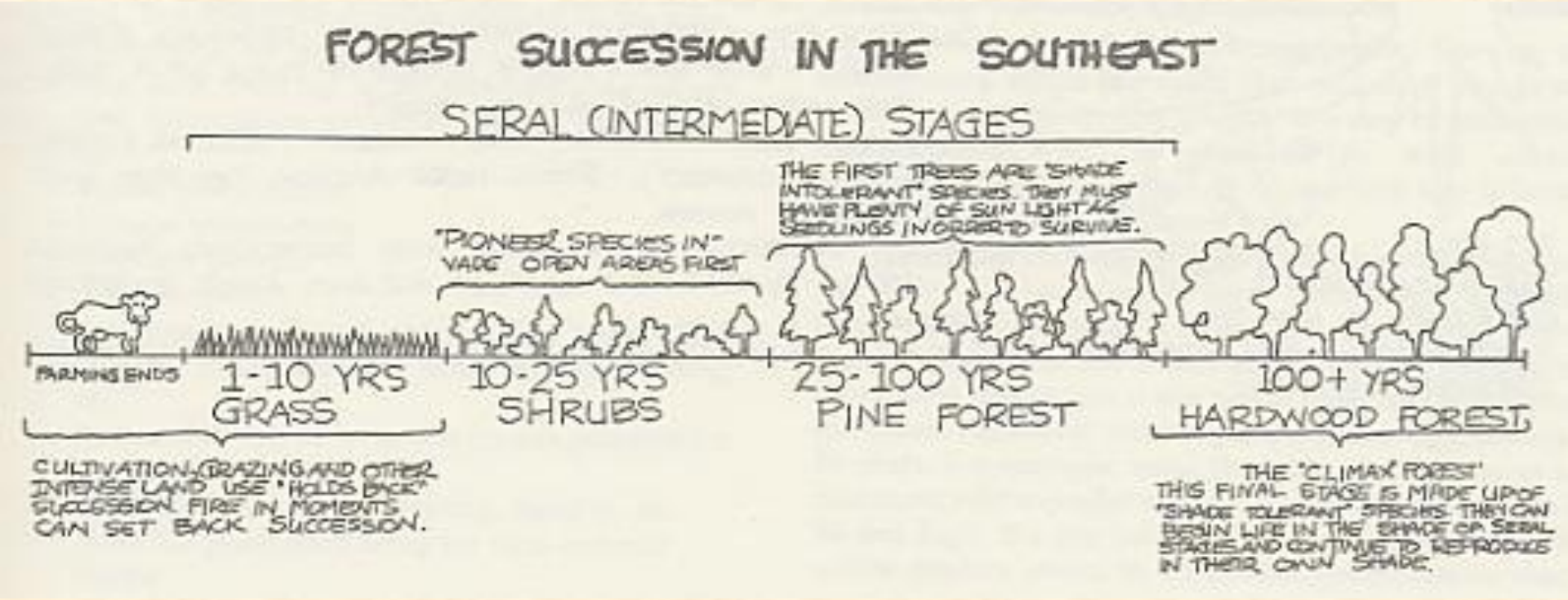
Forest Types

- 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

Forest Ecology - Succession



- 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

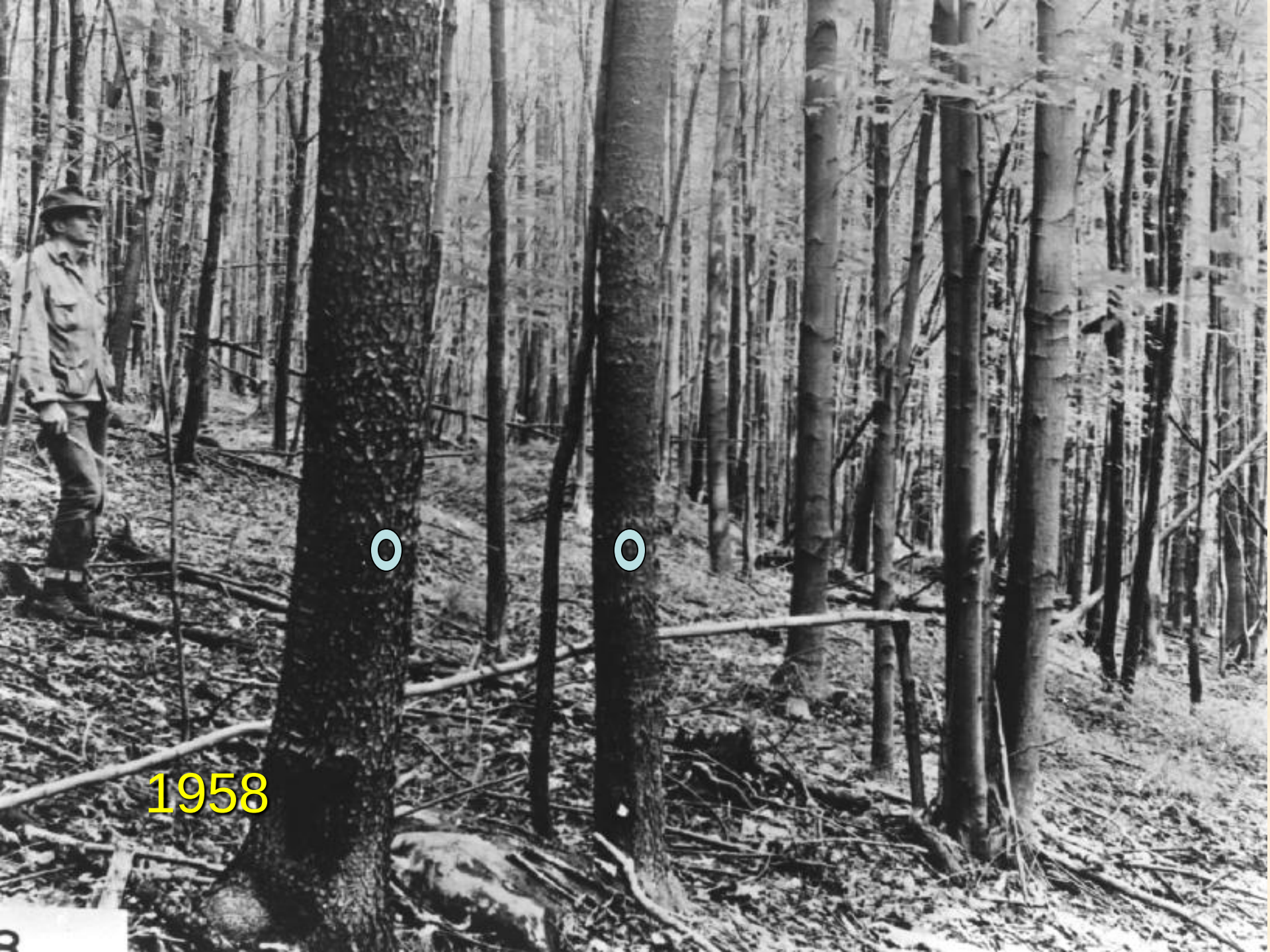
A photographic history from the Allegheny Plateau in Pennsylvania


1927


1928


1937

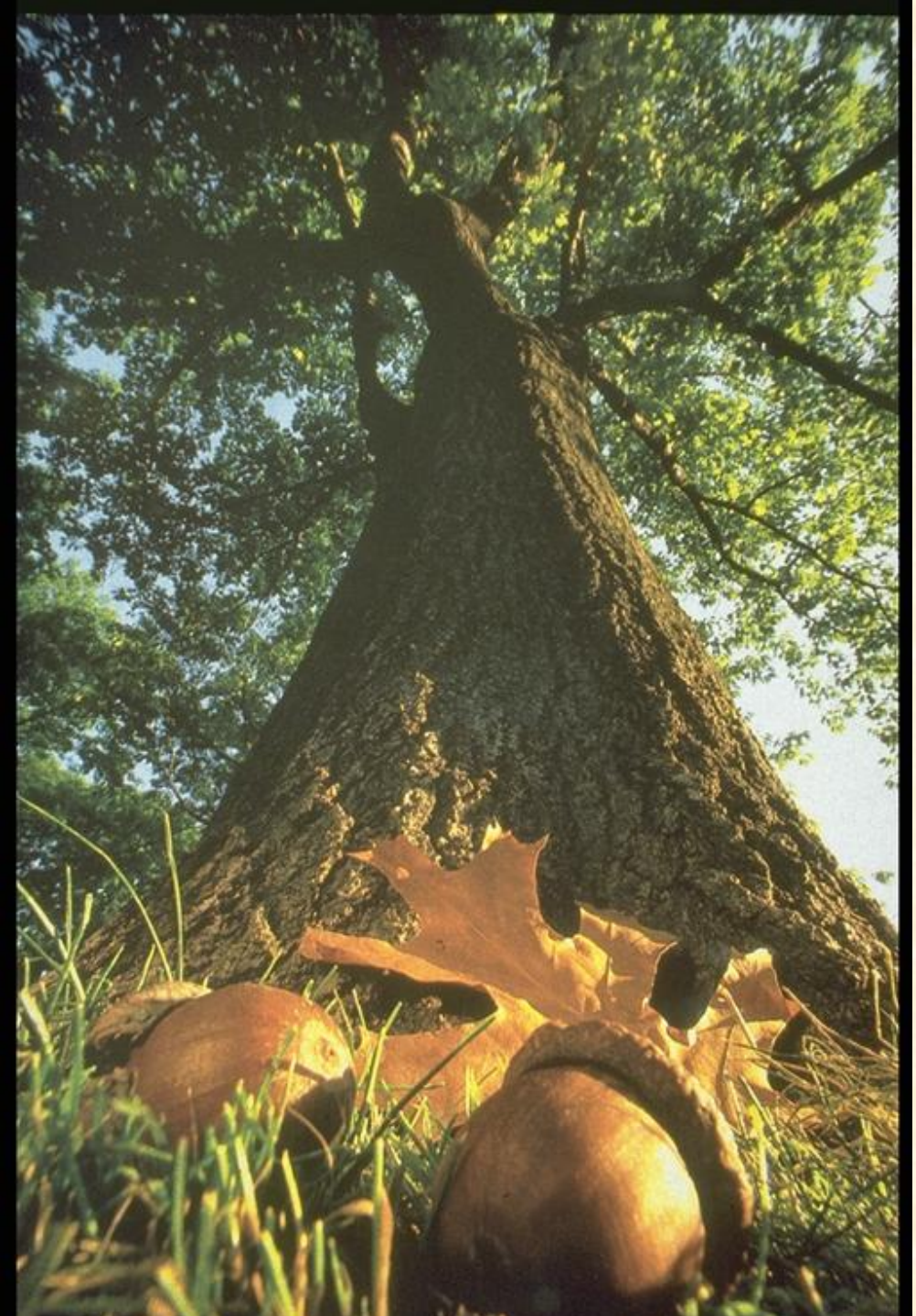

1947


1958


1968


1978


1998



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

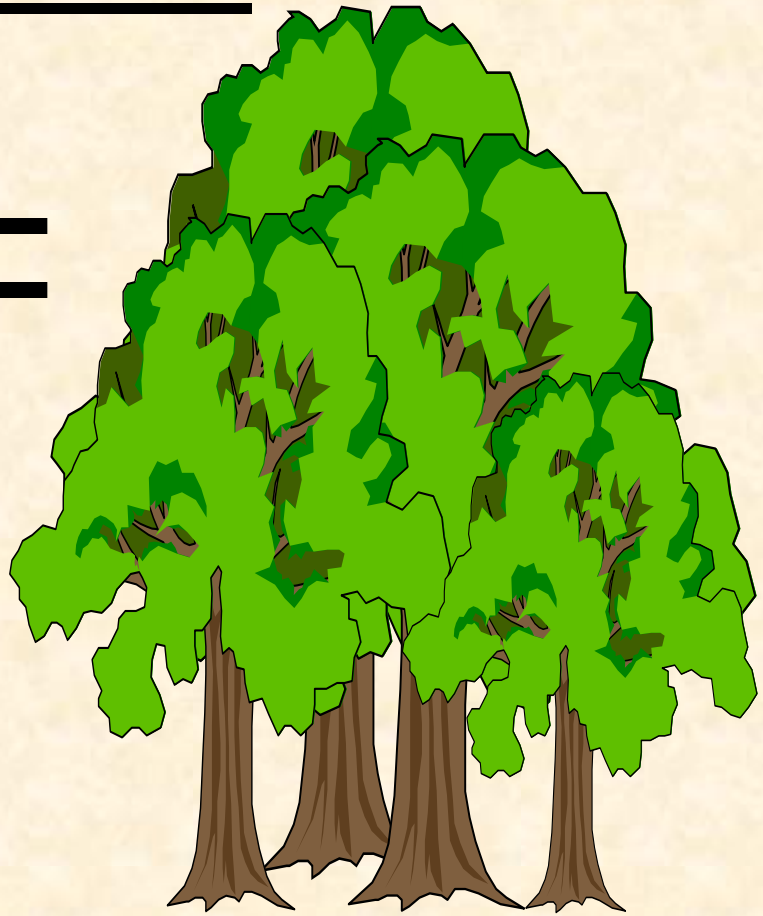
*"The art & **science** of controlling the establishment, growth, composition, health and quality of forest and woodlands to met the diverse needs and values of landowners and society on a sustainable basis."*

The Dictionary of Forestry, 1998

Silviculture is more than just "cutting trees."

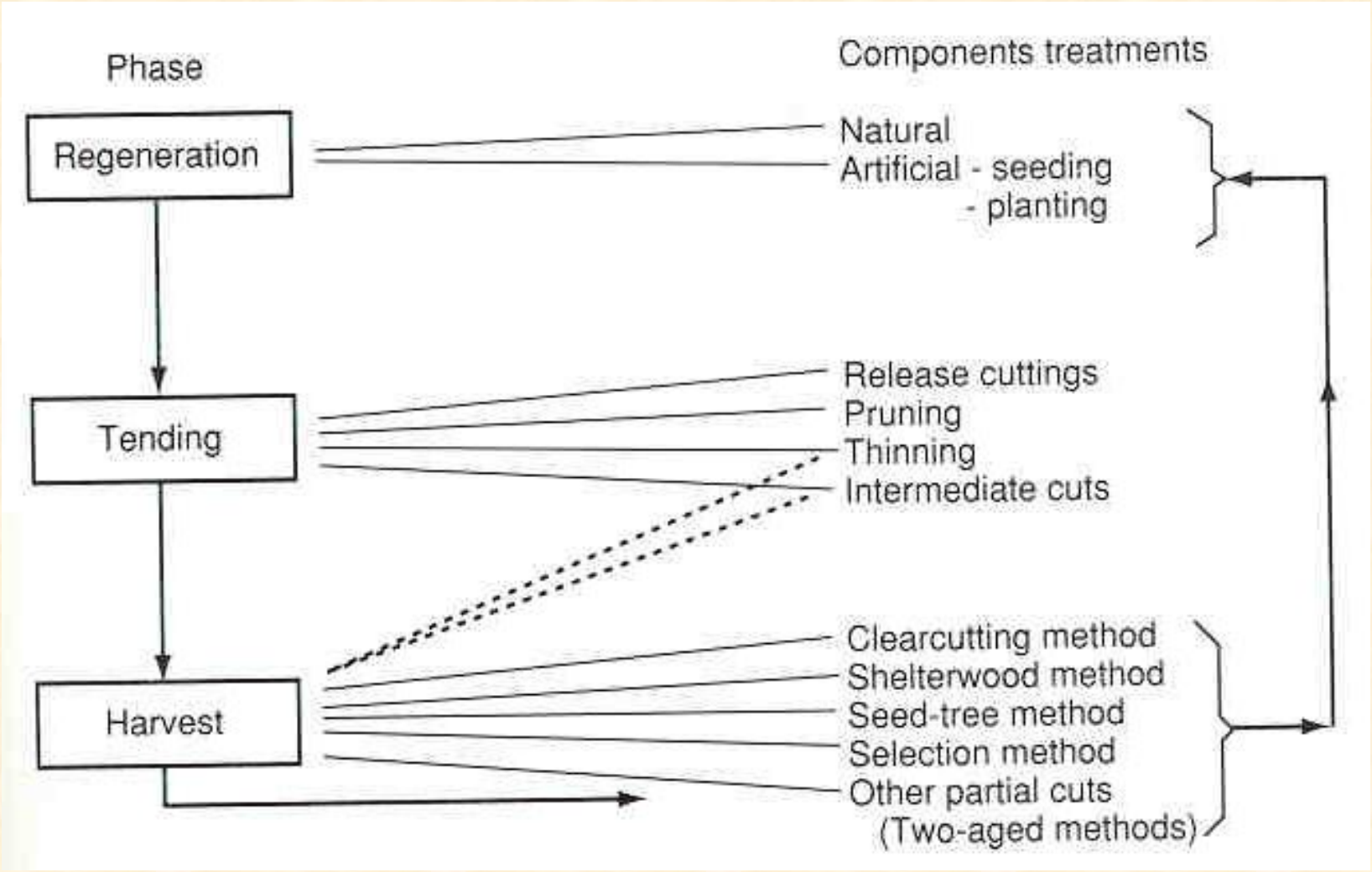
Silviculture

≠



Silverculture

Three Phases of a Silvicultural System



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.

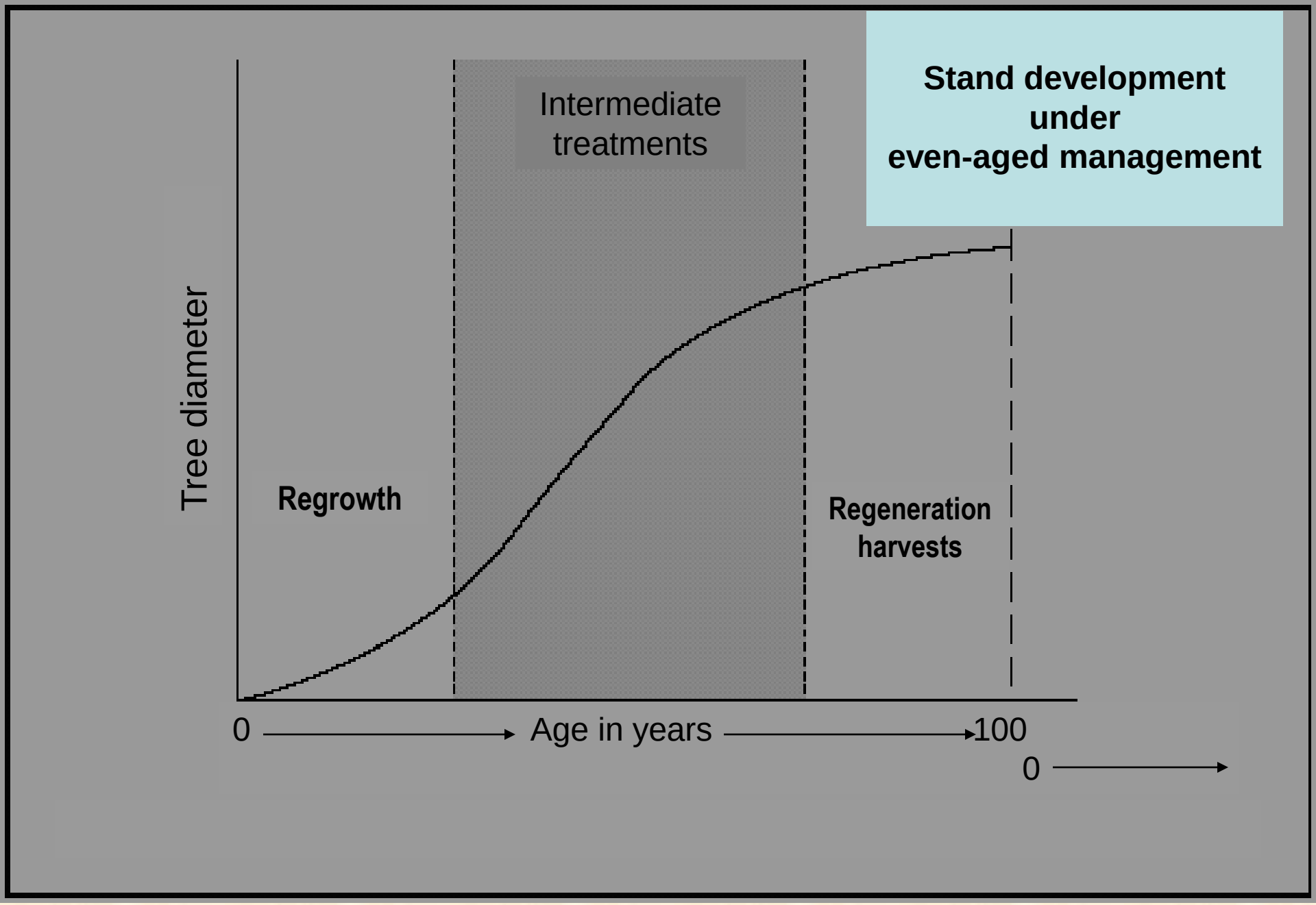
Timber Stand Improvement

- 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.

FIGURE 22-1
Improvement cutting removes trees damaged by natural agents like wind and ice, or injured during logging, freeing adjacent good quality trees in the upper canopy for better growth and development.

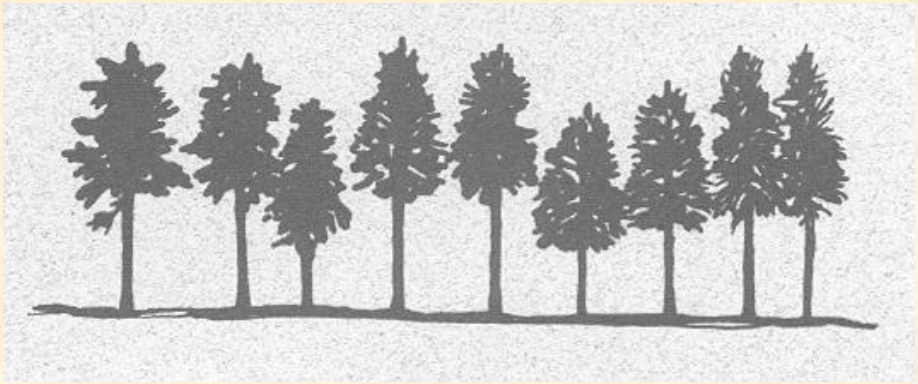
Silvicultural Harvesting Methods *For* Regeneration

- Even-aged systems
  - Clearcut
  - Seed Tree
  - Shelterwood
- Uneven-aged systems
  - Group selection
  - Single-tree selection



Source: Pennsylvania Forest Stewardship Bulletin # 7. *Timber Harvesting: An Essential Management Tool.* Penn State Cooperative Extension.

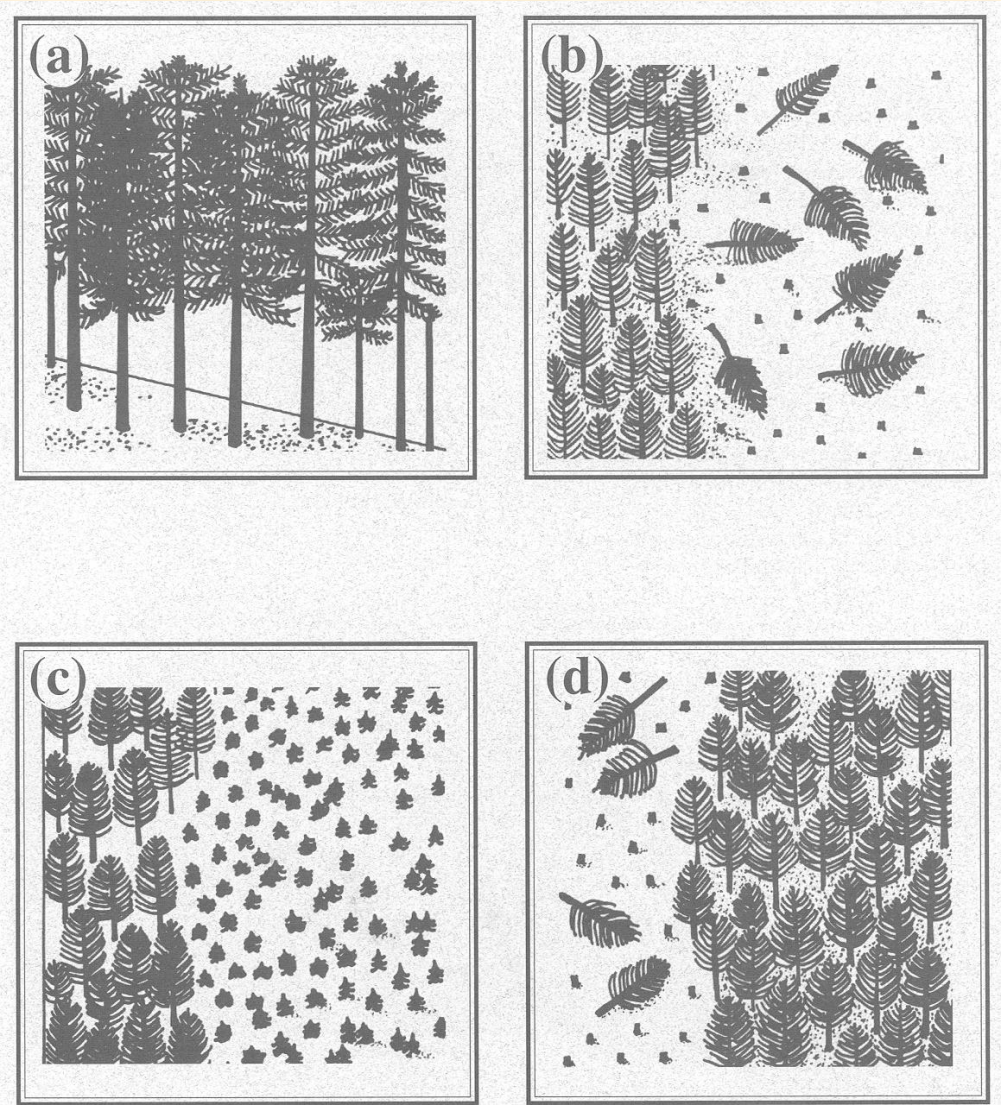
Even-aged Management



- 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.

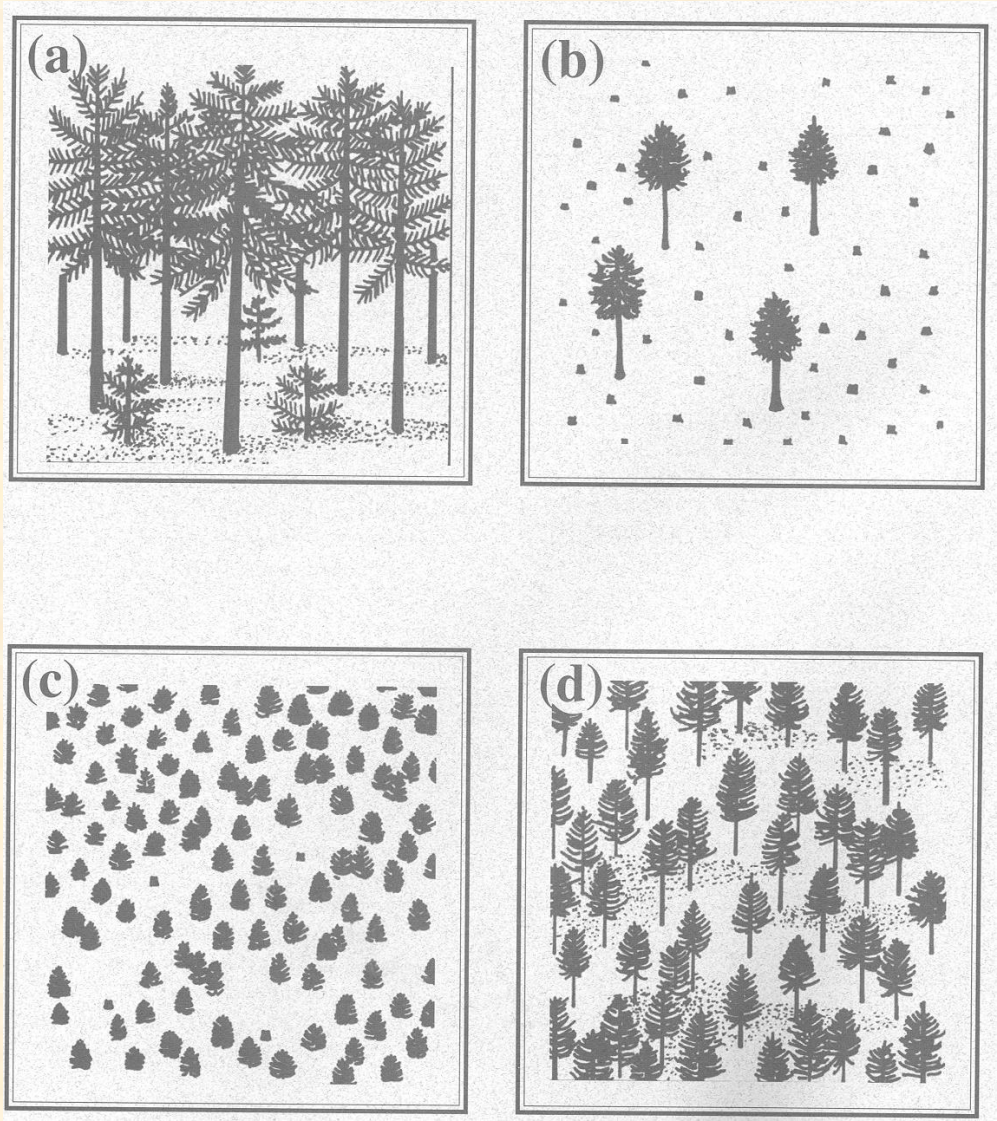


Clear Cutting vs. Land Clearing

- 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).

Seed Tree Method

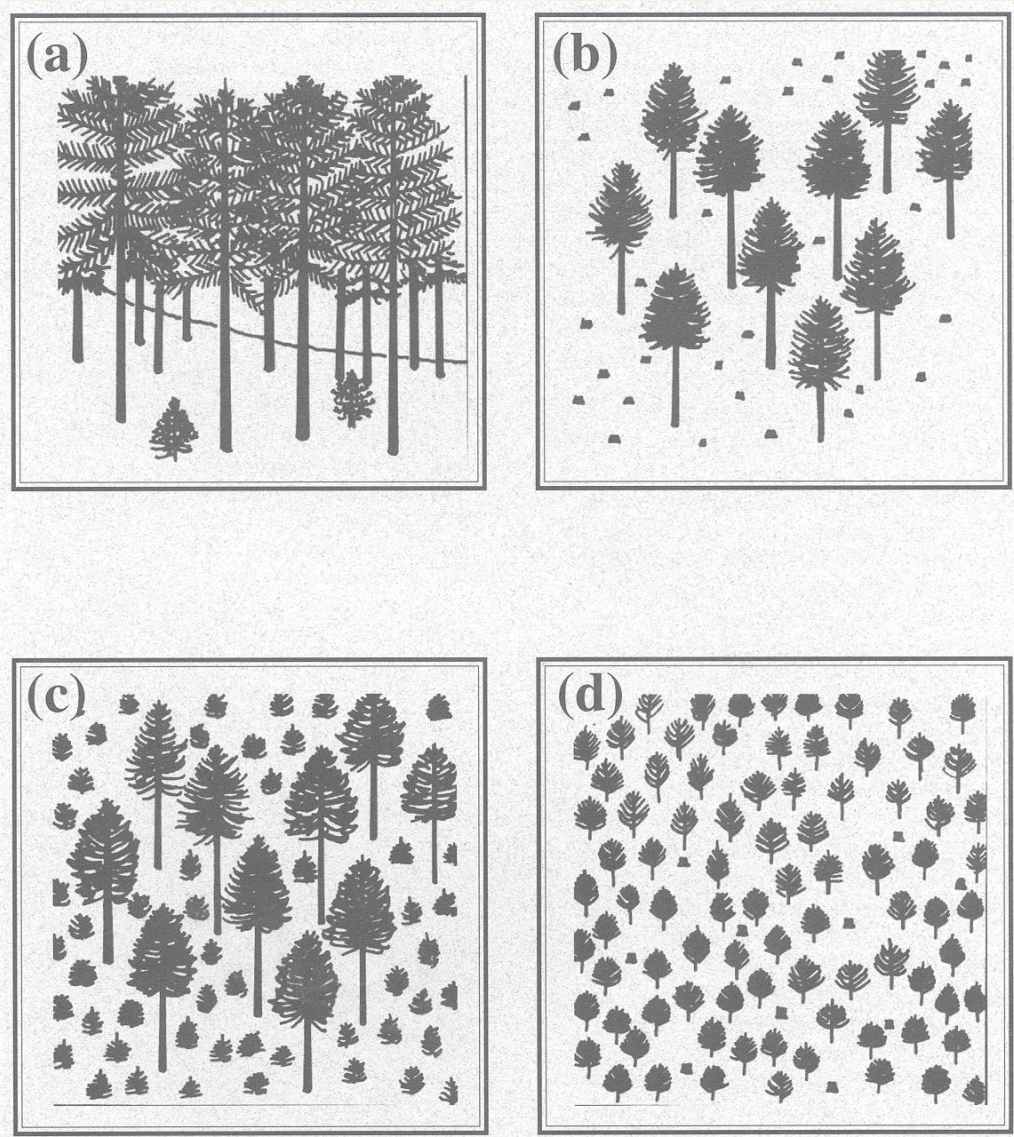
- Number of seed trees left depends on tree height, seed characteristics, wind direction.
- Usually from 3 to 15 seed trees per acre are left behind.
- Seed trees should be the best trees in the stand.



This is a heavy seed tree…about 15 trees per acre.

Shelterwood Method

- 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.

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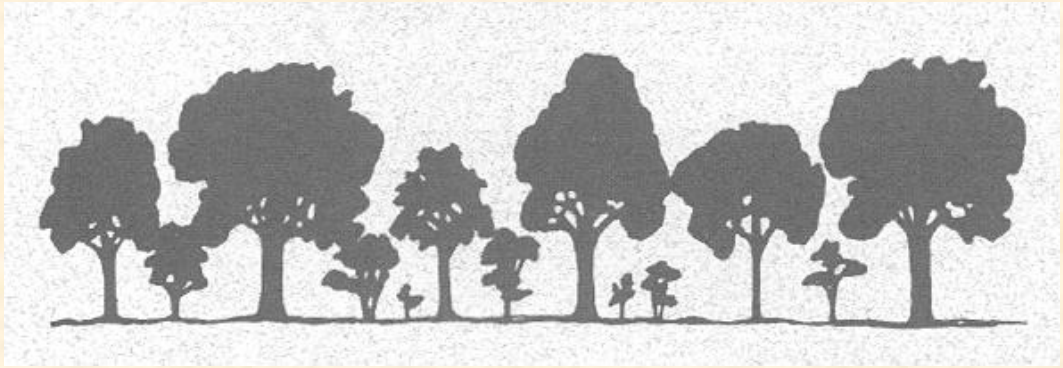
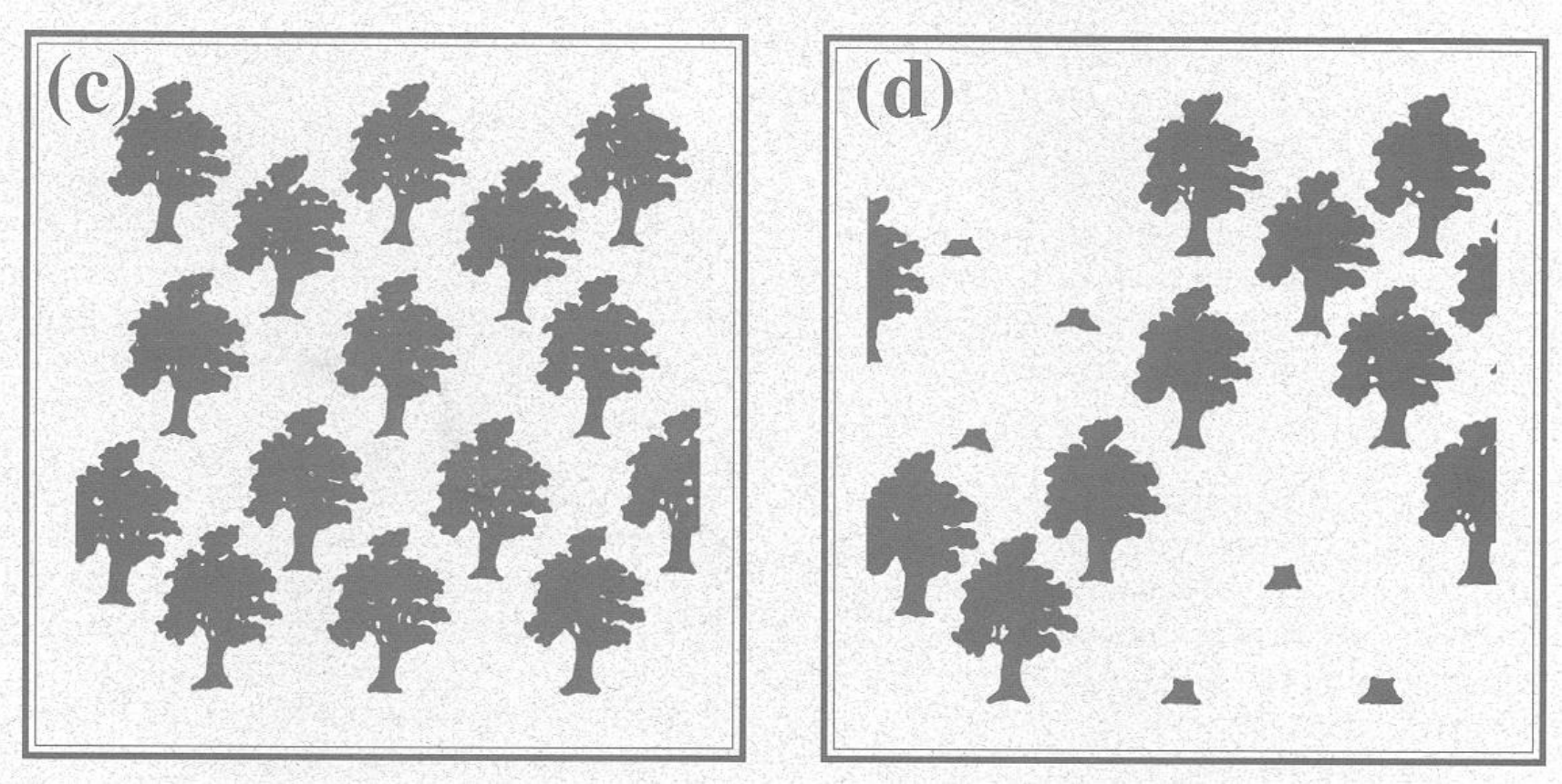
Uneven-aged Systems

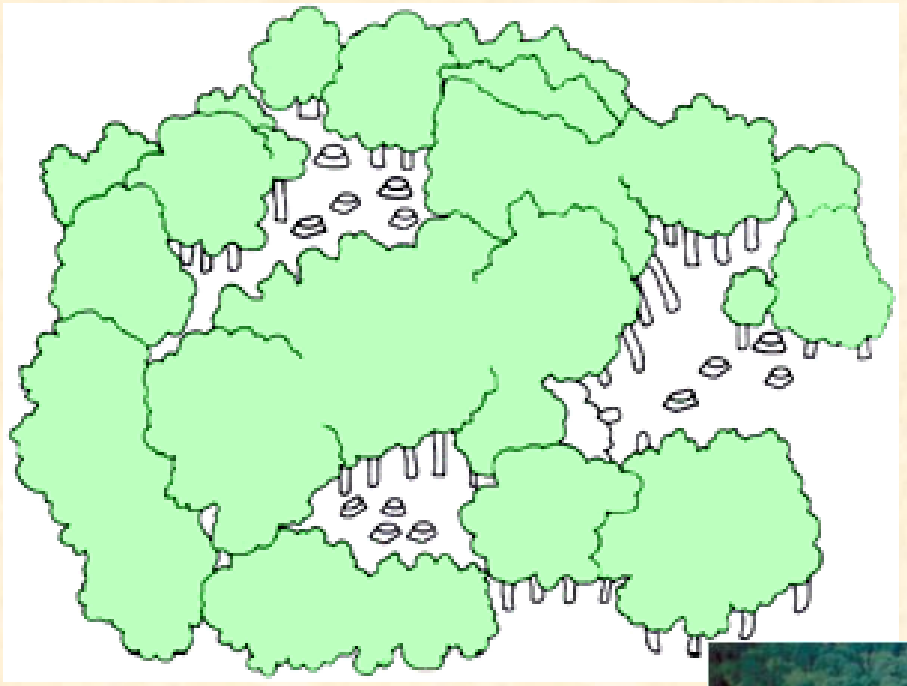


- Contain at least three--and sometimes many more--age classes.
- Trees are harvested singly or in groups, resulting in continuous forest canopy cover.
- The most effective way to regenerate shade-tolerant species.
- Examples include single-tree selection and group selection.

Group Selection Method



- Harvest groups of trees, creating openings no larger than 1 to 2 times the height of surrounding trees.

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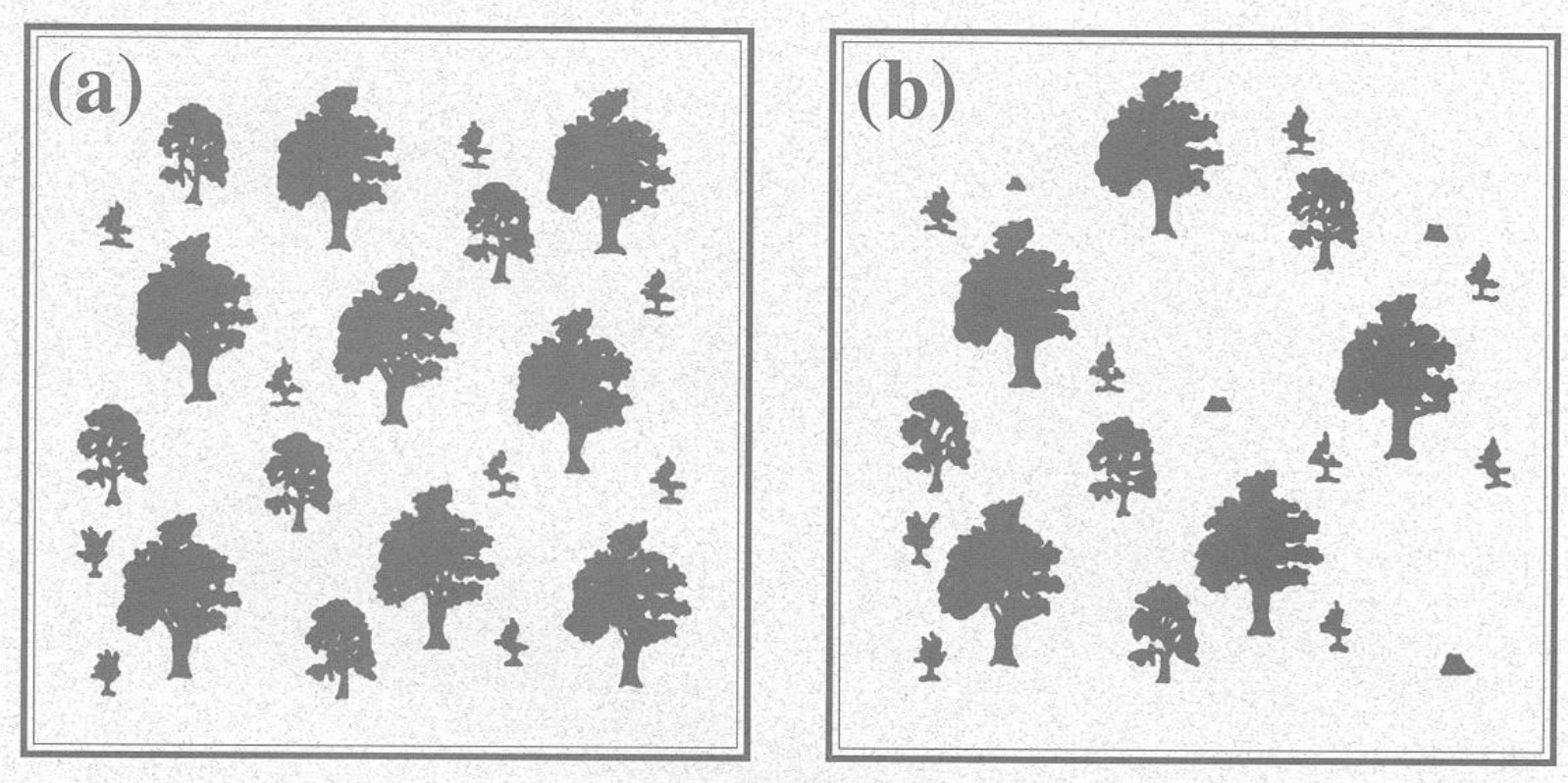
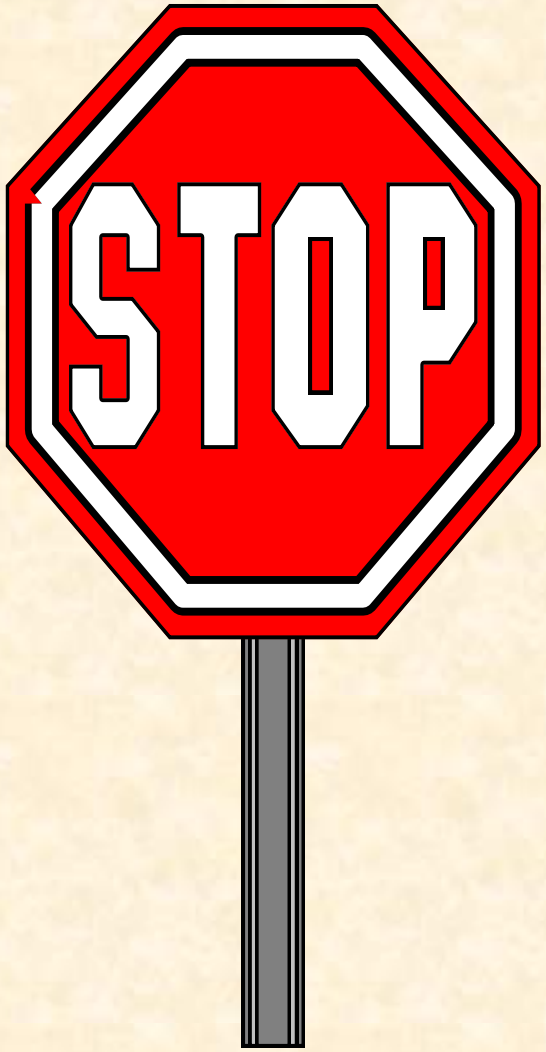
Single-Tree Selection Method



- 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”

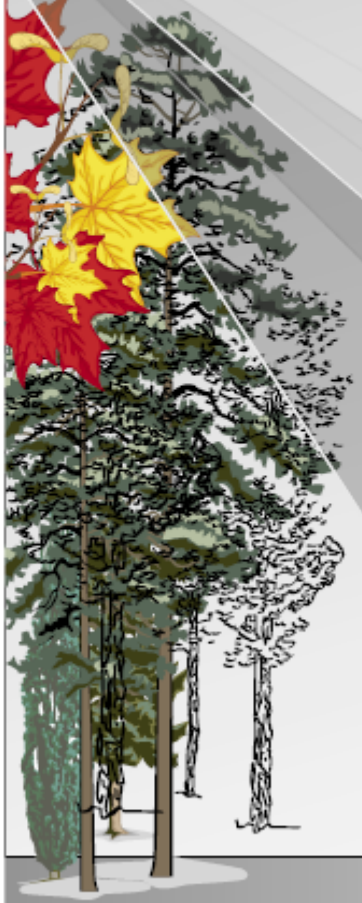
The result of high-grading is a….

Regeneration Continuum

For N.C.'s Piedmont and Coastal Plain

Full shade → **Full sunlight**

TREE SPECIES FAVORED BY VARIOUS HARVESTING METHODS



SHADE LOVERS	INTERMEDIATE	SUNLOVERS
red maple	Atlantic white cedar	eastern red cedar
silver maple	bald cypress	shortleaf pine
pignut hickory	boxelder	longleaf pine
shellbark hickory	sycamore	pitch pine
sugarberry	white oak	pond pine
dogwood	swamp white oak	Virginia pine
persimmon	southern red oak	loblolly pine
beech	overcup oak	river birch
American holly	chestnut oak	bitternut hickory
southern magnolia	northern red oak	white ash
red bay	black oak	green ash
black gum	live oak	sweetgum
tupelo gum	winged elm	yellow poplar
slippery elm	water hickory	cotton wood
	shagbark hickory	cherrybark oak
	pumpkin ash	swamp chestnut oak
	sweet bay	shumard oak
		water oak
		pin oak
		post oak
		black willow
		sassafrass

SINGLE TREE — GROUP SELECTION — SHELTER WOOD — SEED TREE — CLEAR CUT

PARTIAL — COMPLETE

INCREASING INTENSITY of HARVEST →

Regeneration Continuum

For North Carolina's Mountains

Full shade → Full sunlight

TREE SPECIES FAVORED BY VARIOUS HARVESTING METHODS

SHADE LOVERS

- Fir
- Spruce
- Striped maple
- Red maple
- Silver maple
- Sugar maple
- Buckeye
- Pignut hickory
- Shellbark hickory
- Redbud
- Dogwood
- Persimmon
- Beech
- American holly
- Mulberry
- Black gum
- Slippery elm
- Mountain laurel
- Witch hazel
- Rhododendron
- Hemlock

INTERMEDIATE

- White pine
- Boxelder
- Sycamore
- White oak
- Southern red oak
- Chestnut oak
- Northern red oak
- Black oak
- Winged elm
- American elm
- Yellow birch
- Shagbark hickory
- Fraser magnolia
- Cucumber tree
- Hazelnut

SUNLOVERS

- Eastern red cedar
- Shortleaf pine
- Table mountain pine
- Pitch pine
- Virginia pine
- Loblolly pine
- Ailanthus
- Sweet birch
- River birch
- Bitternut hickory
- Mockernut hickory
- White ash
- Green ash
- Honey locust
- Butternut
- Black walnut
- Sweet gum
- Yellow poplar
- Cottonwood
- Pin cherry
- Black cherry
- Scarlet oak
- Post oak
- Black locust
- Willow
- Sassafrass

SINGLE TREE — GROUP SELECTION — SHELTER WOOD — SEED TREE — CLEAR CUT

PARTIAL — COMPLETE

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


Timber Management
Wildlife Management
Soil & Water Conservation
Recreation
Aesthetics
FORESTS

Questions???

Contact

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Dr. Seuss' The LORAX project™