Silviculture

Art & science of establishing & tending trees & forests

Karen Bennett, karen.bennett@unh.edu
Extension Forestry Professor & Specialist
Presented to NH Coverts, May 17, 2019

University of New Hampshire
Cooperative Extension

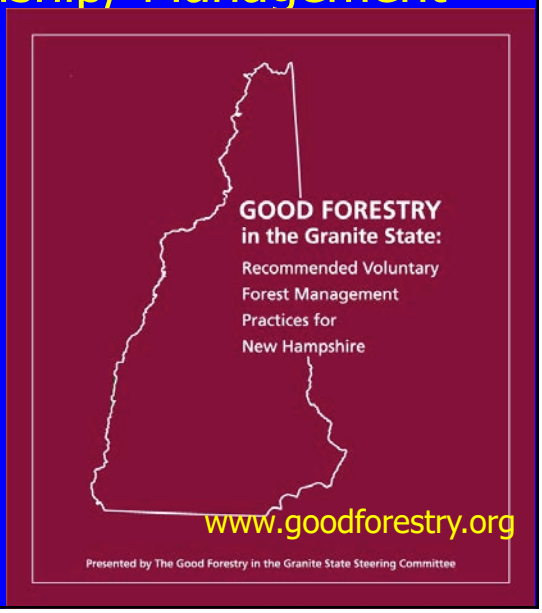
Silviculture Actions Have Two Broad Outcomes

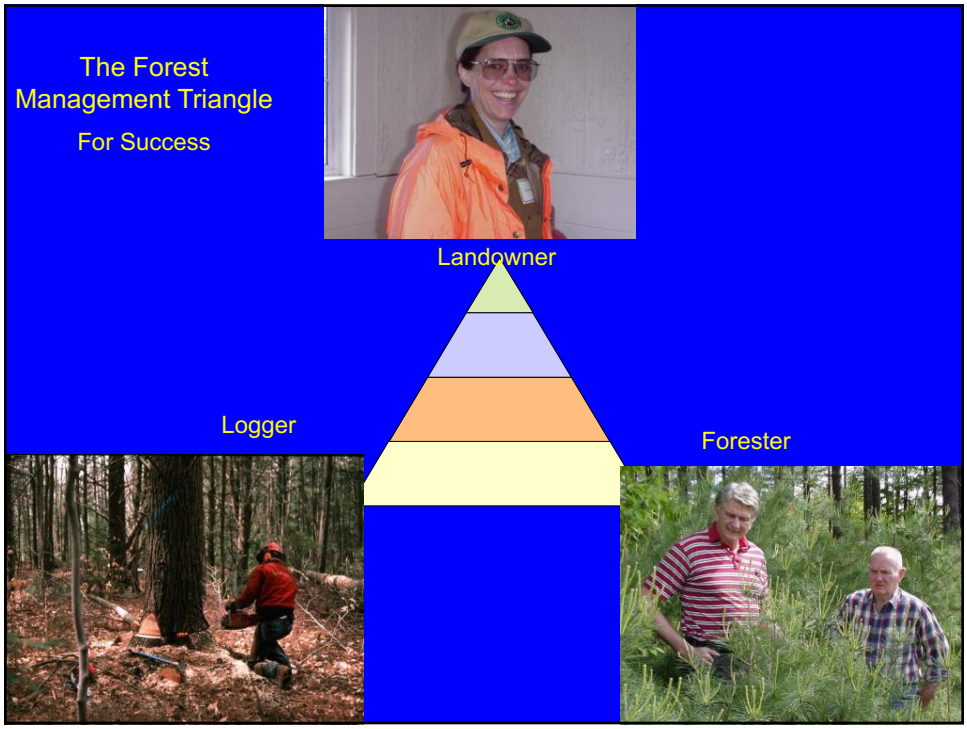
- Grow the trees that are already present
  - tending
- Start new trees
  - regenerating
- In practice, often accomplish both outcomes at once
- Most common actions- cut trees or leave trees

Harvesting is the most common tool for conducting silviculture

Hallmarks of Good Forest Stewardship/ Management

- Considers multiple resources
- Based on landowner objectives
- Uses best available practices
- Practices based on a plan
- Looks long term
- Uses professionals
- Uses best available science- SILVICULTURE



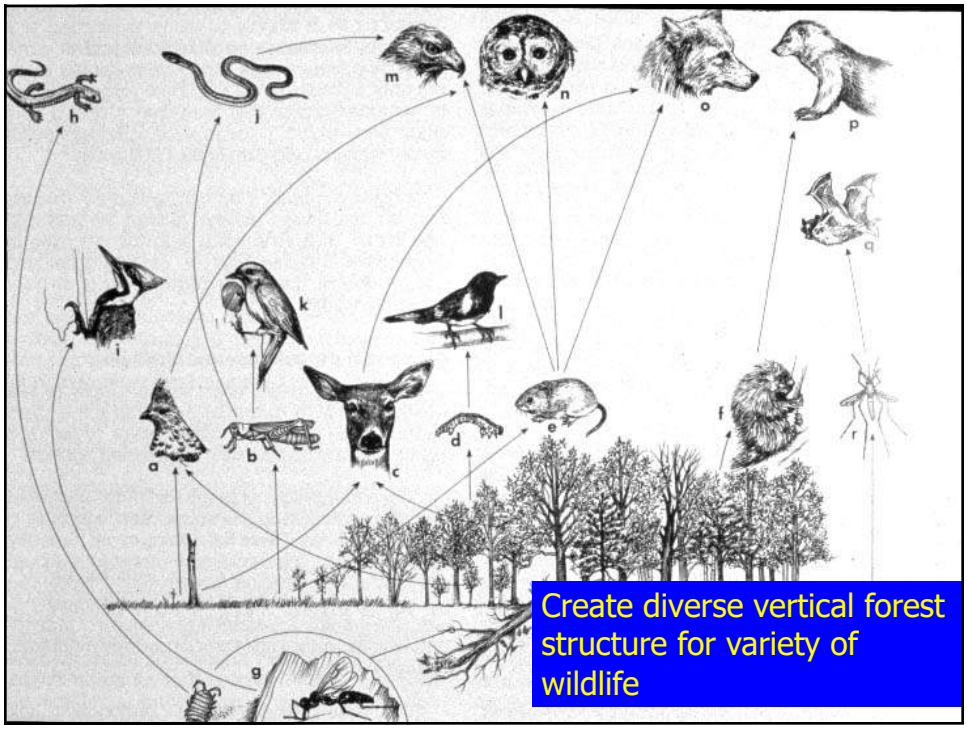

The Forest
Management Triangle
For Success
Landowner
Logger
Forester

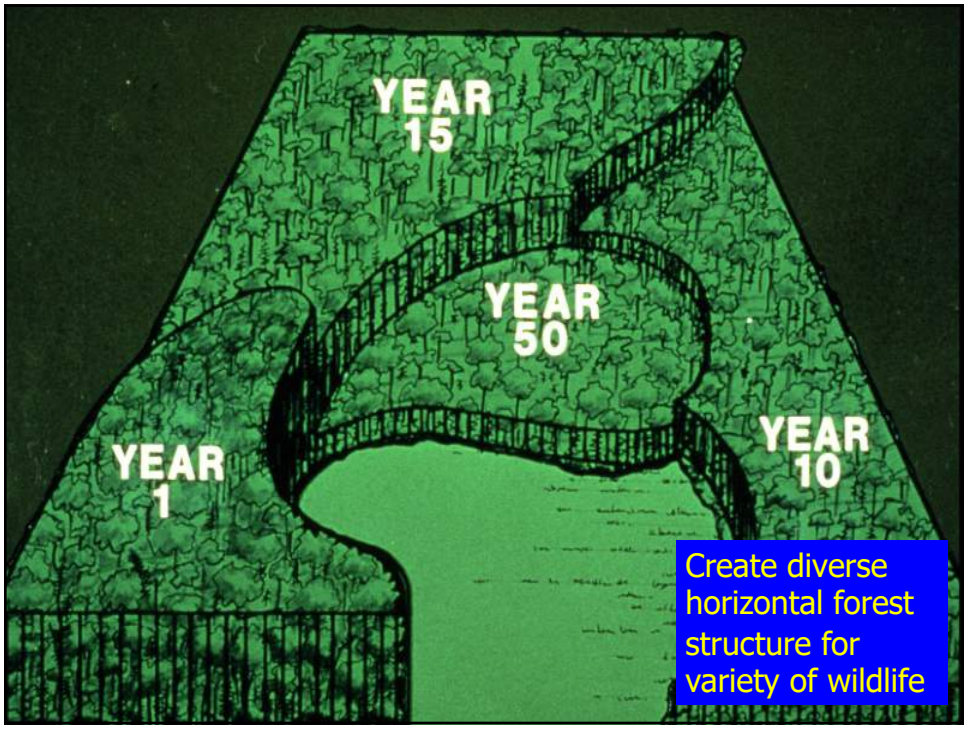

Silviculture can be used to create and maintain the kind of forest meets landowner objectives
Can be single or multiple objectives


Grow big trees for beauty, wildlife, and timber for money to send the kids to college.


Create standing snags and down woody material


Create temporary wildlife openings


Create diverse vertical forest structure for variety of wildlife


YEAR 15
YEAR 50
YEAR 10
YEAR 1
Create diverse horizontal forest structure for variety of wildlife


Create Coverts of aspen "popple" for grouse

Grow red oak for hard mast and high quality timber

Develop sugar maples for beauty, snags, seed, and maple syrup

Regenerate paper birch for the looks

Don’t fight the site—soils matter

Remember Shade Tolerance

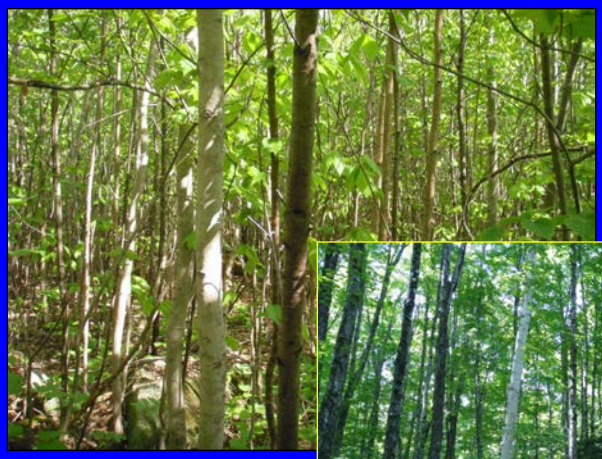
Tolerance is the ability of a tree to grow satisfactorily in the shade of another tree.

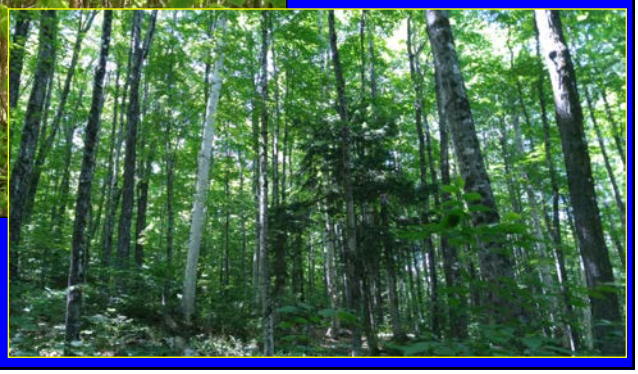
As a stand succeeds tolerant species replace intolerant species.

Know if Stand is Even-Aged

- Even-aged—trees started at same time after a disturbance
- All about the same height—different diameters
- Larger diameter—occupied the site, captured the sun, overtopped others
- Crowns larger, diameter larger—yet trees are same age
- Large diameter trees aren't necessarily older—Diameter not a good predictor of age
- What is the management implication of this?

Tending: Intermediate Practices





Tending: Intermediate Activities

- Release
- Thinning (weeding and thinning, crop tree release)
- Improvement Cutting
- Pruning

Release

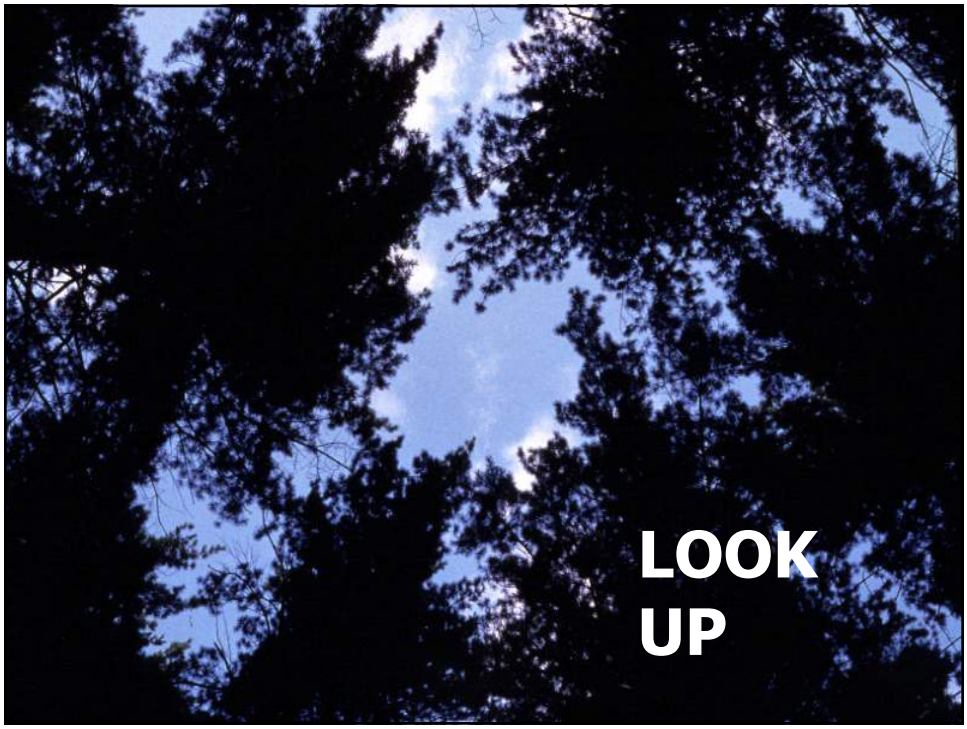
Thinning

weeding and thinning, tsi or timberstand improvement, fsi or forest stand immprovement

- Increase growth of specific trees (crop trees)
- Remove trees deemed less desirable
- 20-50+ years
- 4-10 inches DBH (pole size)
- 10- 16 inches DBH (small sawlog)
- Firewood, chips, sawlogs

When thinning
What I do when I choose trees to cut

- Look for the trees I want to grow
  - Species – Most valuable for timber- keep options open to cut for timber in the future
  - Healthy – look up at the top, trees with the largest tops relative to their neighbors
  - Relatively straight, with at least one log before trunk forks (maintains option to cut timber in the future)
- Remove trees touching their top
- Mark the trees to cut (or leave)



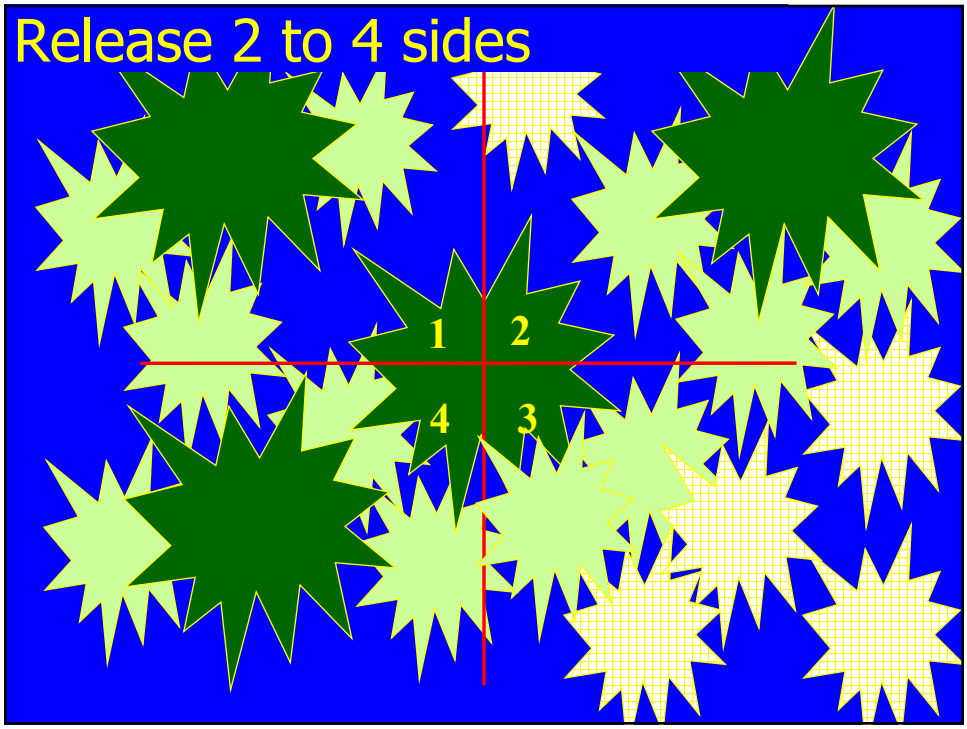
Leave trees with large, healthy tops.

Leave valuable crop trees: timber, mast, aesthetics

Cut trees of poor form and low vigor.

But don't cut them all, since many of these trees have important wildlife values.

Only cut a tree if its bothering your crop tree



Crop Trees Left to Grow

Crop Trees Cut

Leave Healthy Trees

Mark Your Trees to Cut and Leave

Regeneration (seedling or sprouts)

All about manipulating light

Timing of the harvest is important:

- In terms of the life of the stand- and-
- In terms of time of year
- In good seed years

Which silvicultural technique use depends on:

- species present
- species want
- site capability

Planting after you cut trees?

In New England- not usual

Most of our forests regenerate rapidly after cutting

Sprouts

Most hardwood species stump sprout

especially important for regenerating red maple and red oak

Aspen and Beech root sucker/clone

Softwoods do neither and must be regenerated from seed

advance regeneration

-presence of seedlings/saplings before overstory removed

-red oak, white pine, red spruce, hemlock, balsam fir, sugar maple

Scarification

- Disturb the soil- not very deep- mix leaf litter with mineral soil
- To create a seedbed for regeneration
- Usually during logging
- Absent snow, drier time of year
- In the absence of advance regen
- In a good seed year
- White pine, red oak, yellow birch, hemlock

Remember tree tolerance: Opening size important in determining which species will regenerate.

Opening size determines amount of light in the opening

Regeneration
Silvicultural Systems

Uneven-aged
- Single tree selection
- Group selection

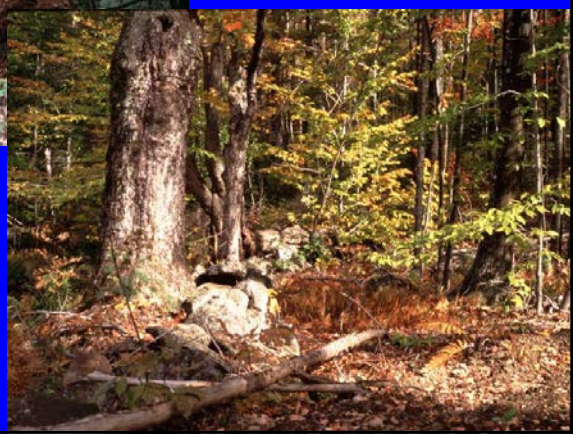
→ Less light
- On ground
- Tolerant trees

Even-Aged
- Shelterwood
- Seed tree
- Clearcut

→ More light
- On ground
- Intolerant trees

Two age- from a partial cutting scheme such as shelterwood or group selection. May be temporary.

Legacy trees for structure



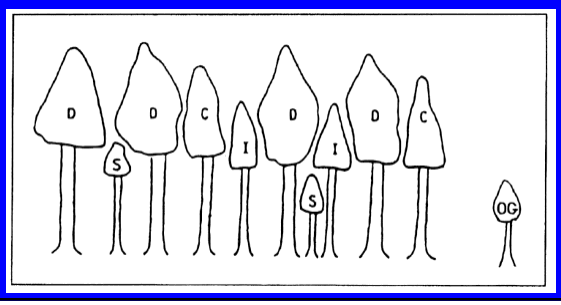
Single Tree Selection

Uneven-aged

- At least 3 distinct age classes free to grow
- Achieved by a series of harvests
- Mature and low quality trees cut in all sizes
- Regenerate tolerant species
- Maintains a mature canopy and vertical structure- a wall of green
- Beech, sugar maple, red spruce, balsam fir, hemlock
- Diameter limit cutting not advised

Diameter Limit Cutting isn't Selection Harvesting

- Choosing trees to cut based primarily on a minimum diameter- cut larger trees
- Smaller diameter trees aren't necessarily younger
- More likely never got enough sun to grow



Group Selection

Uneven-aged

- 1/4 to 1/2 acre groups cut
  - Up to 2 acres
- Can think of approaching patch clearcuts
- For regenerating intermediate tolerant species (red oak, white pine, white ash, yellow birch)
- aspen and paper birch (groups approach 1 acre)
- Better scarification than individual tree


Group Size Openings
(diameter of circle)
1/20 acre----52 foot
1/10 acre---75 foot
1/5 acre---- 105 foot
1/4 acre----117 foot
1/2 acre----166 foot
2/3 acre----200 foot
1 acre------234 foot

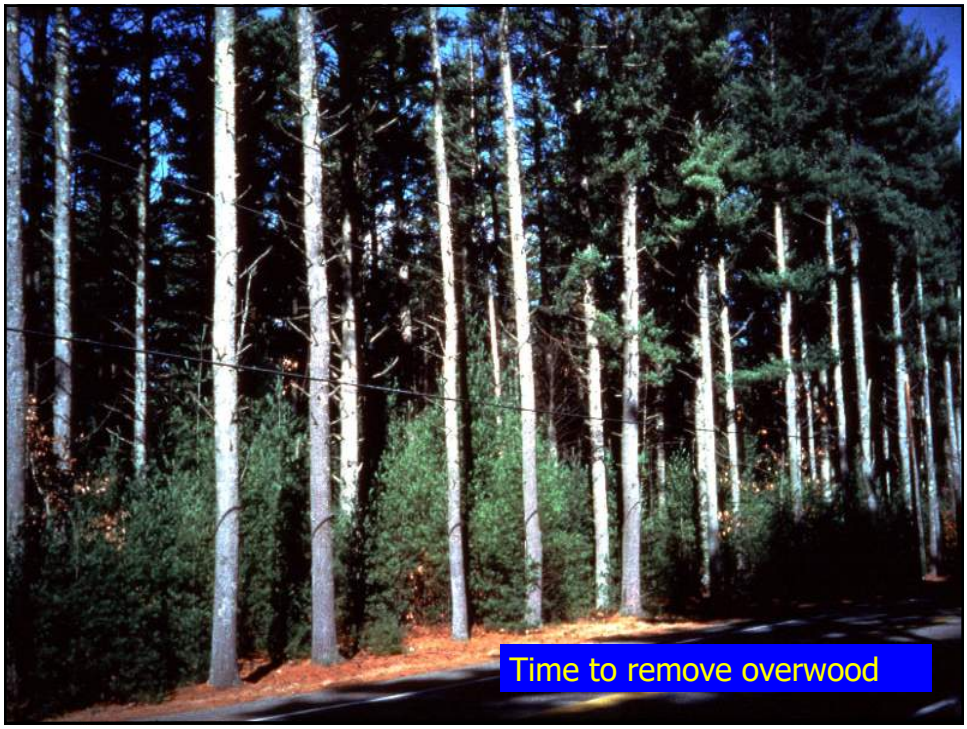
Shelterwood

Even-aged

- Series of harvests to regenerate
- Harvest removes smaller trees, leaving larger trees to provide correct light conditions and seed source
- Cutting can look light to heavy
- Heavier shade regenerates tolerants (red spruce or hemlock)
- Lower amounts of shade regenerates intermediate tolerants (red oak and white pine)
- Cut overstory when understory regenerated- may be in multiple stages


First cut-
- no advance regeneration
-leave overwood for shade and seed


Sometimes looks like selection- difference is timing of final cut of big trees


Time to remove overwood


Red oak
white pine
red spruce
balsam fir
hemlock

Seed Tree

Even-aged

- Leave 5-10 desirable trees per acre
- For seed, visual relief
- Good source for future snags and super canopy trees
- May leave these for entire rotation

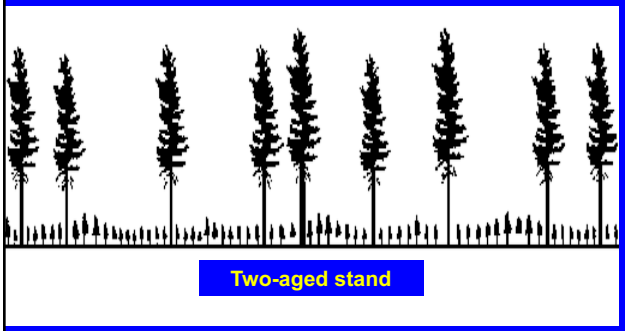
Clearcut

Even-aged

- Cut everything 2" and greater
- Size depends on objectives and ownership
- Variations- patches and strips
- Regenerates
  - intolerant (paper birch, cherry, aspen/poplar)
  - intermediate (yellow birch and red oak)
  - tolerants with advance regeneration

Two-aged stands

Seed tree cuts, deferred shelterwoods, shelterwood with reserves, clearcuts with reserves can be considered two-aged stands as long as some of the original overstory trees remain in the stand



Enhances vertical and horizontal diversity

Common practice on private land to retain some of the overstory trees indefinitely for aesthetics, wildlife trees, future woody material