

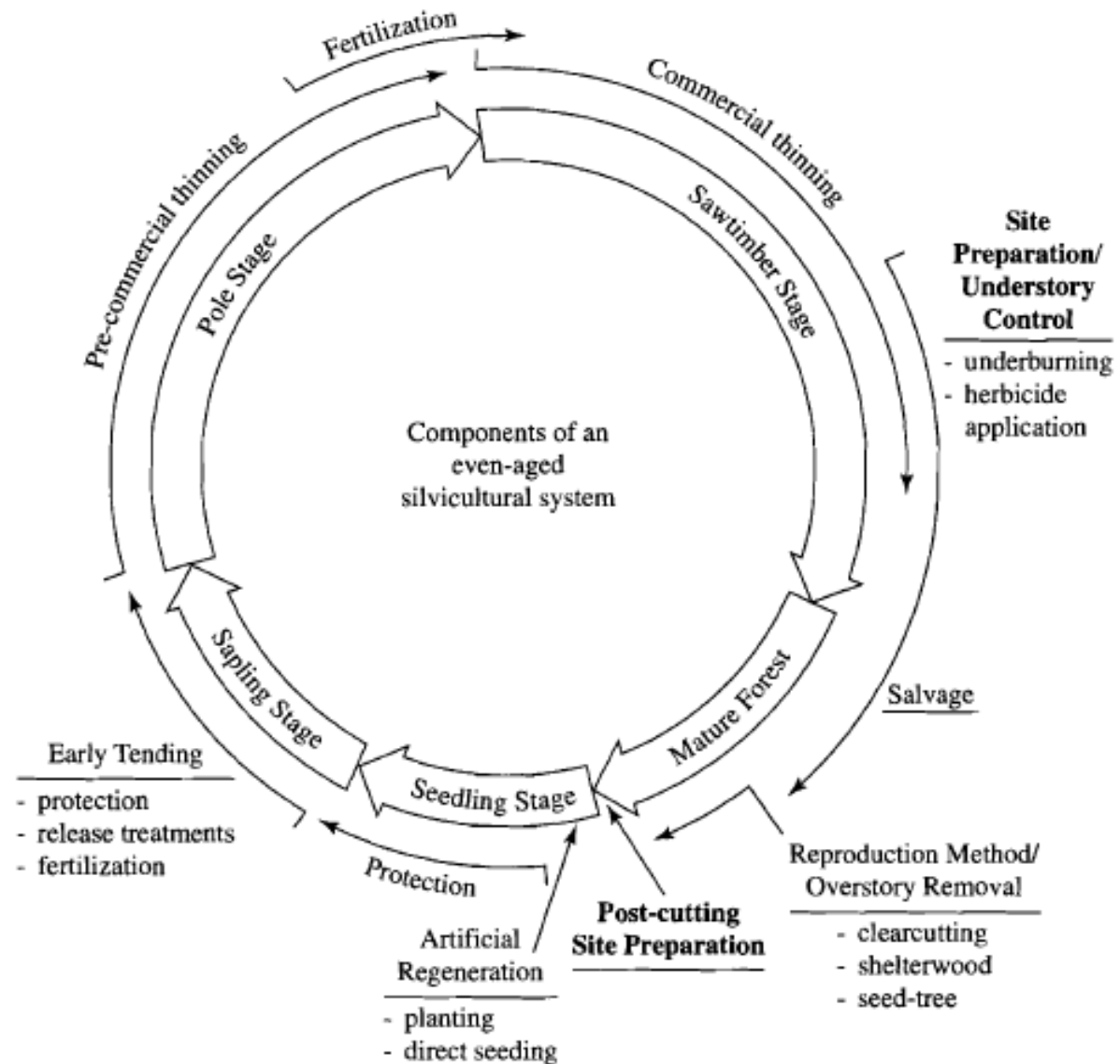
Silviculture Review

- **A Definition:**
- Controlling forest establishment, composition, health and growth through the application of ecological principles
- To meet the needs and values of landowners and society

The science and art of growing trees and forests

Silviculture Systems vs. Treatments

- A silvicultural treatment is a single activity to achieve an objective
- A silvicultural system is a series of treatments designed to accomplish long-term goals
- If a **treatment** is not part of a **system** then it's not really silviculture



Natural Disturbances - a Basis for Silviculture

- Silvicultural systems and treatments often mimic natural disturbance types and patterns— severity, scale, frequency.
- Intended to promote specific species or communities – so often are based on disturbances/regimes to which those species are adapted.



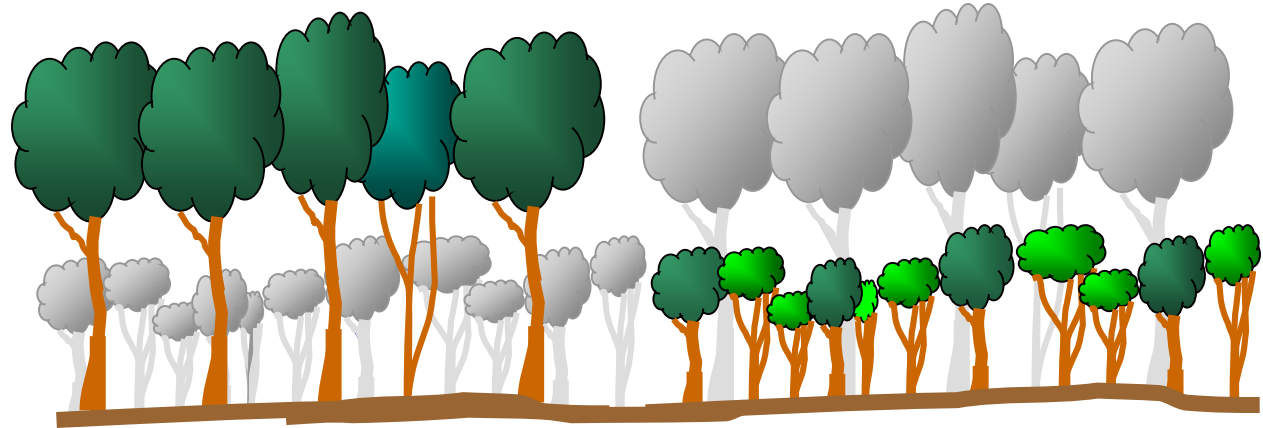
Disturbance: The Agent of Change

~ Type, Intensity and Frequency ~

Define “Disturbance Regime” and influence forest composition.



Type:



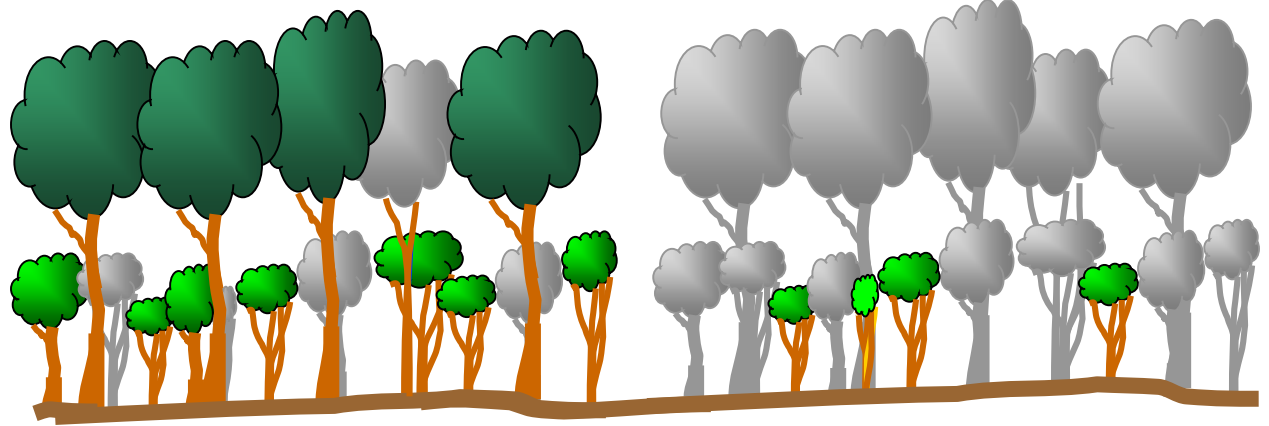
**Low (understory)
disturbance**

**High (overstory)
disturbance**



Disturbance types vary from those that remove the smallest trees in the understory (grazed forest at top) to those that predominantly remove the largest trees (microburst at bottom).

Intensity:



Single tree
mortality

Stand
replacement



Disturbance intensity can range from single tree mortality (top), to small windthrown groups (middle), to complete stand removal (bottom).

Frequency:



Active forest fire suppression began in the Northeast during the early 1900s.



Drought effects can range from early leaf drop to death of weakened trees.



Ice storms periodically open forest canopies by breaking off weaker or structurally unsound branches and tops.



A major hurricane strikes our area about every 100 (?) years leaving a large swaths of damaged forests.

Mimicking Natural Disturbance. Using: Species' Adaptations to Disturbance Regimes and “Disturbance Regimes” to influence forest composition.



Management activities such as thinning a stand by removing the smaller trees (right) will mimic some conditions created by a wildfire that kills all but the largest trees (left).



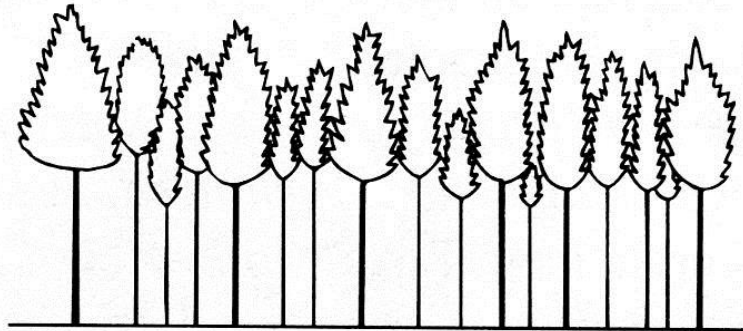
Management activities such as clearcutting (right) mimic natural processes such as a wind storm (left).



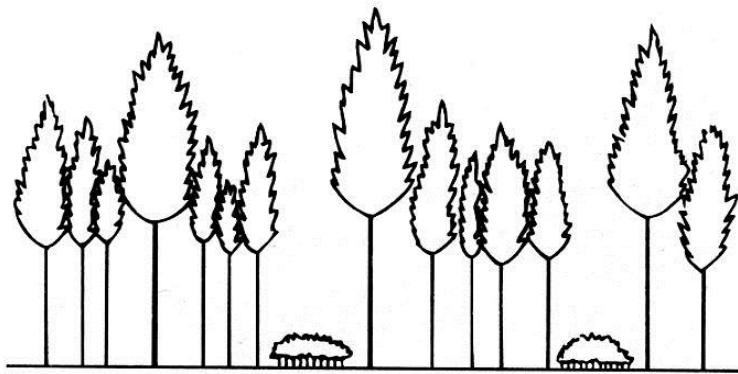
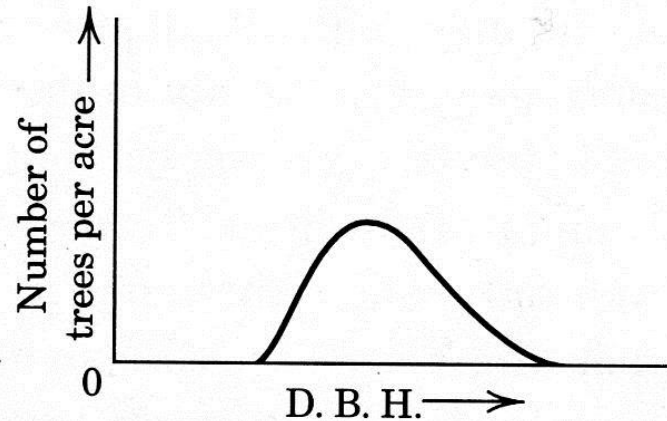
Silvicultural Systems:

Two major categories

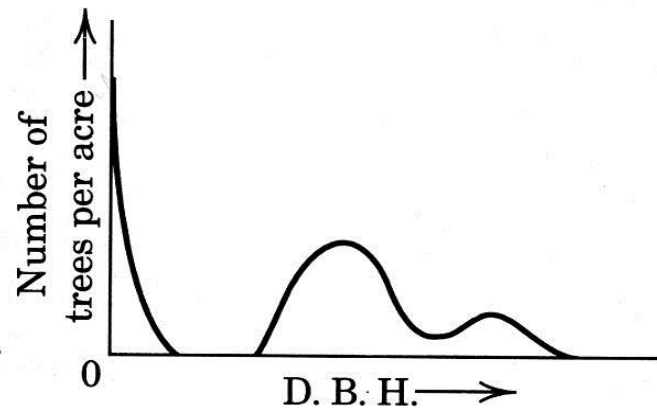
- Those designed to establish and grow **even-aged** stands
- Those designed to maintain **uneven-aged** stands



Even-aged stand



Irregular uneven-aged stand



Silvicultural Systems

Even-aged systems:

- Clear cutting
- Seed tree
- Shelterwood



Uneven-aged systems:

- Single-tree selection
- Group selection

Silvicultural Treatments:

Two major categories

- **Intermediate treatments:** altering existing stand density, structure or composition
- **Regeneration treatments:** Establishing new trees or releasing seedlings/saplings into the canopy



Thinnings

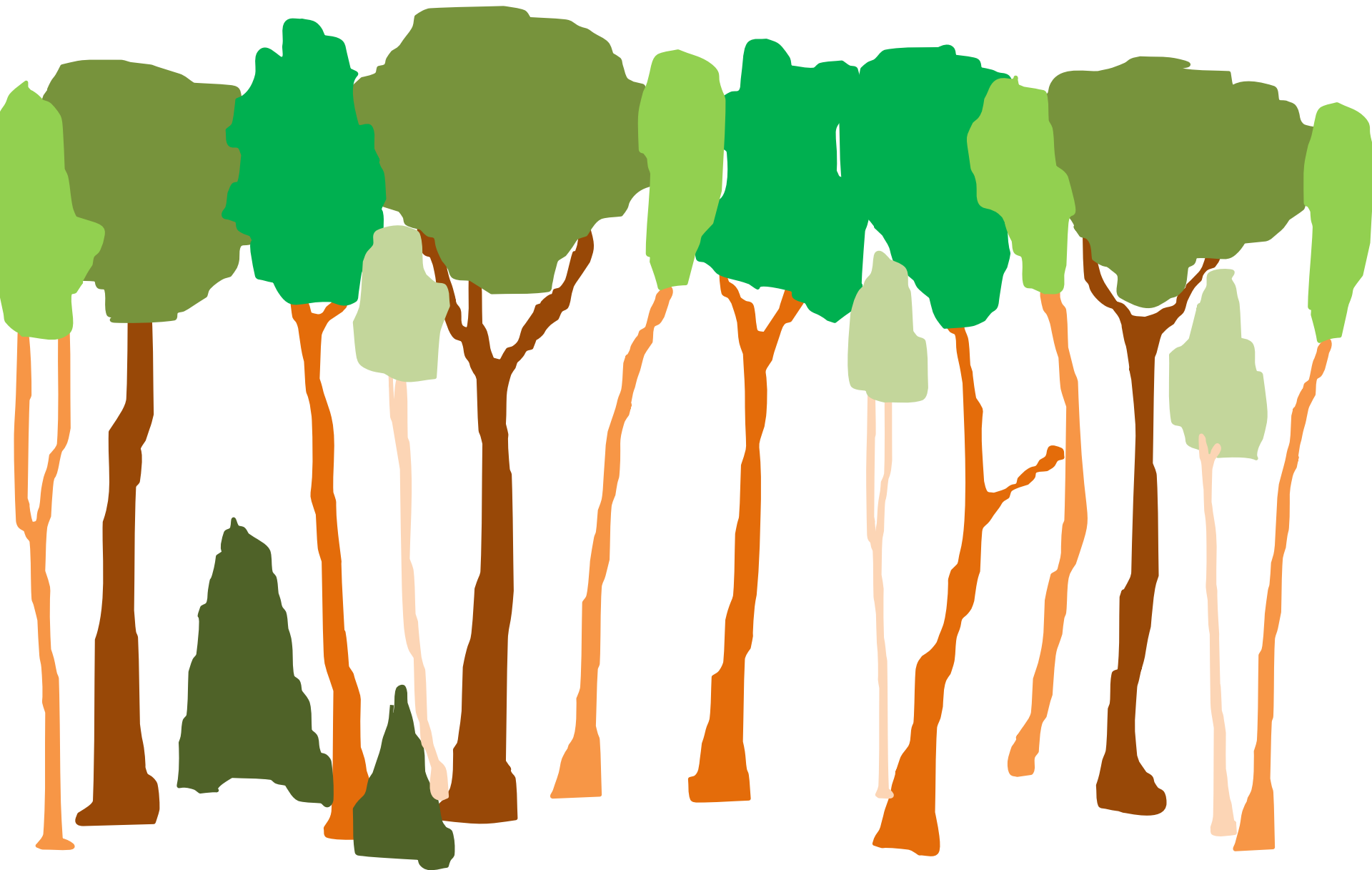
Intermediate treatments in commercial-sized stands to redistribute the growing potential of a site to desirable growing stock.

- Salvage anticipated losses from competition mortality
- Increase rate of diameter growth
- Yield income/ control investment
- Improve quality
- Alter species composition
- Reduce risk of damage

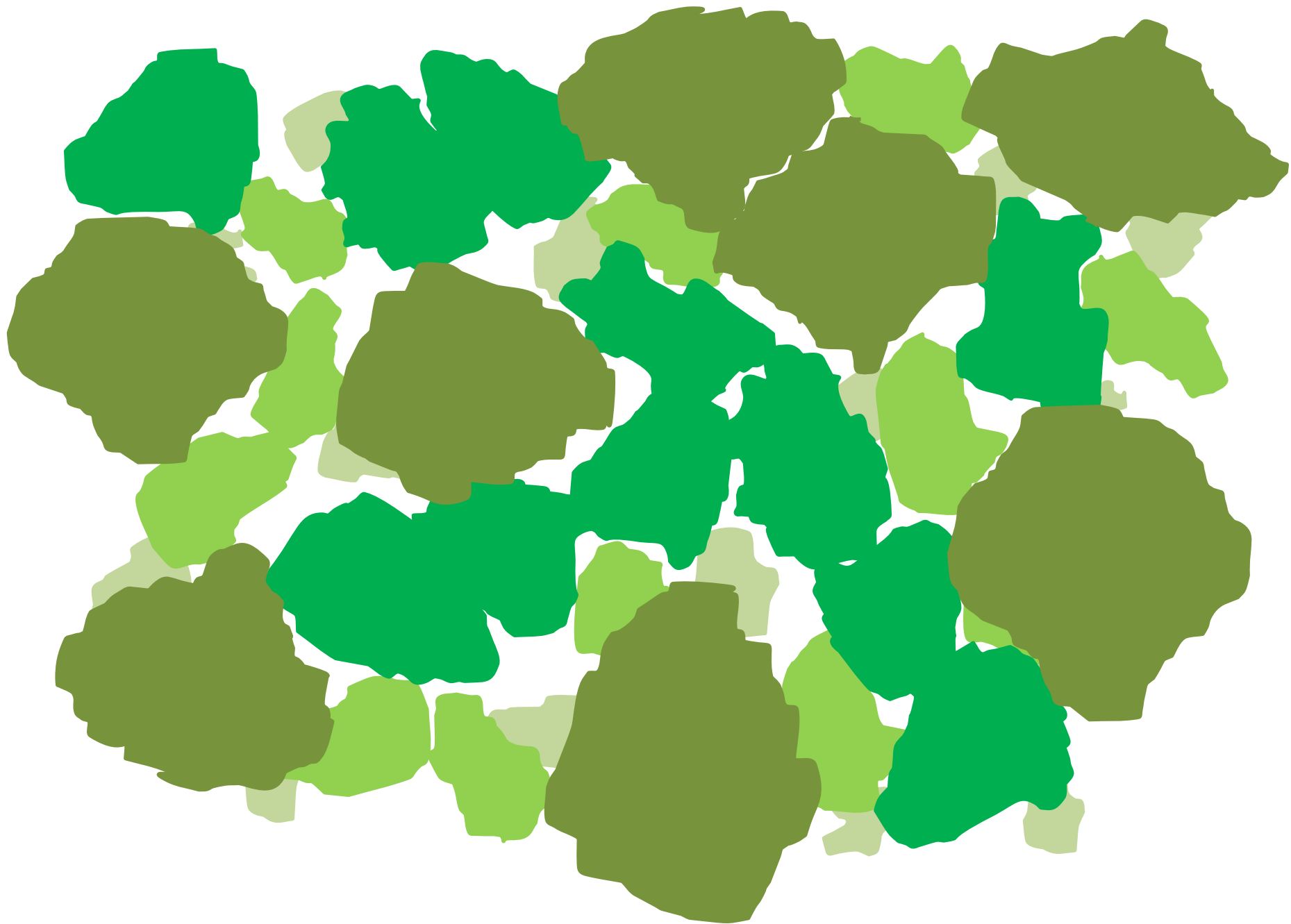
Thinning Methods:

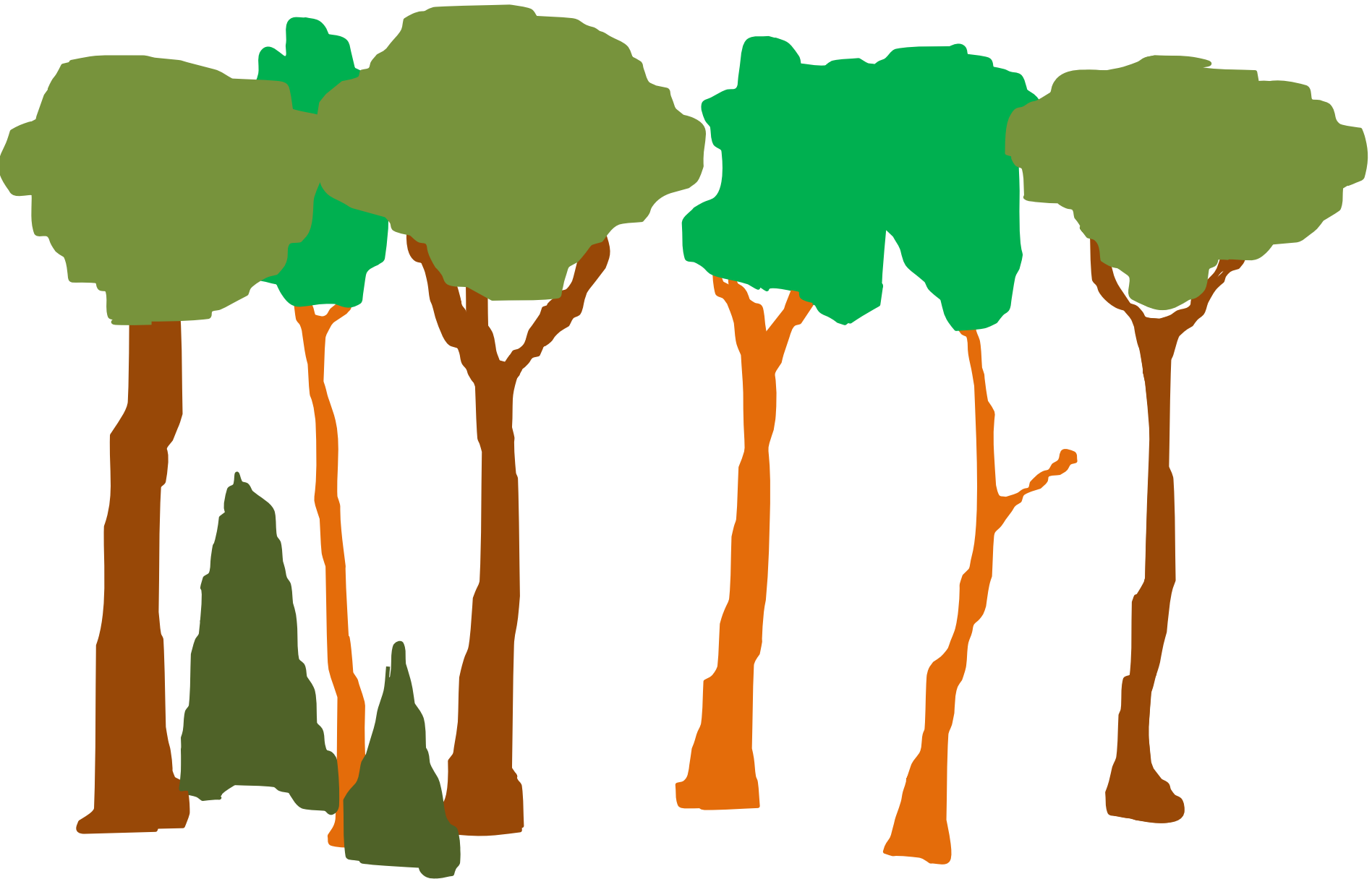
- Low thinning
- Crown thinning
- Selection thinning
- Mechanical or geometric
- Free thinning



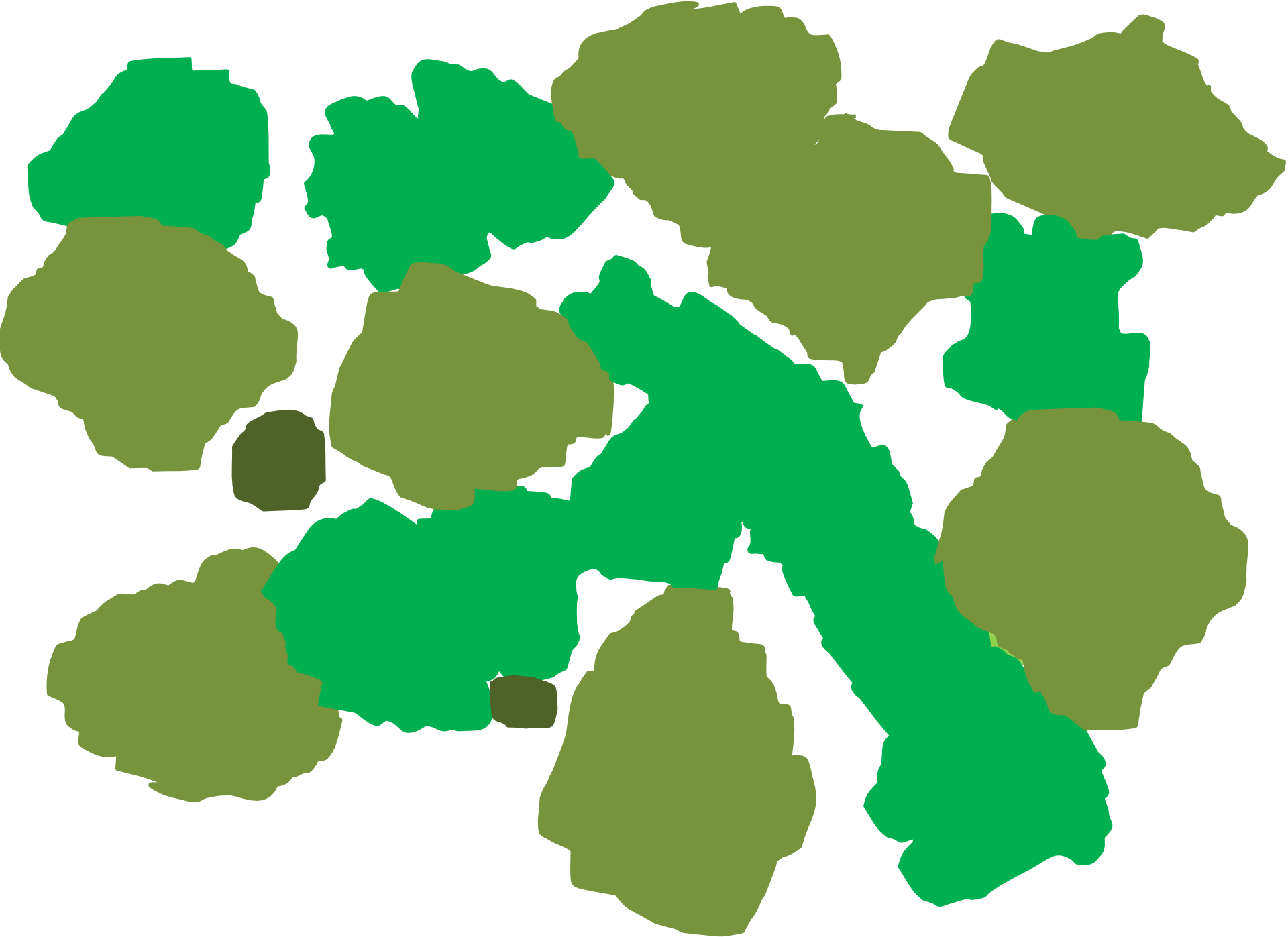


Low thinning: remove intermediate and overtopped growing stock





Low thinning can be applied more than once and at varying degrees of intensity



When thinning a stand...

- Growing space and resources are reallocated to the residual trees
- The choice of residual trees depends on defined objectives
- Some regeneration might occur, but that is not the intent

Crop Tree Management:

Specialized type of intermediate treatments in commercial-sized stands intended to provide “free-to-grow” crown space for pre-selected crop trees.

- Removes competition from three of four sides
- Generally no disturbance of other trees in the stand

Release Methods in non-commercial stands (TSI):

- Cleanings
 - Weedings
 - Sanitation cuts
- Liberation cuts



Silvicultural Treatments

Regeneration Treatments – correspond with associated systems

Even-aged:

- Clear cutting
- Seed tree
- Shelterwood



Uneven-aged:

- Single-tree selection
- Group selection

Hybrid Regeneration Methods:

Regeneration treatments designed to address multiple goals

- Species
- Age structure
- Aesthetics
- Habitat
- Income
- Climate

Various Methods:

- Strips
- Patches
- Group Selection
- Shelterwood with reserves
- Irregular Shelterwood
- Crop Tree final harvest





Regenerating Oaks

United States
Department of
Agriculture

Forest Service

Northern
Research Station

General Technical
Report NRS-329



Prescribing Regeneration Treatments for Mixed-Oak Forests in the Mid-Atlantic Region



Two cardinal rules of successful oak silviculture:

- 1) There must be competitive sources of oak regeneration in advance of the final overstory harvest, and
- 2) Advanced oak regeneration must be adequately and timely released.

Ignoring these cardinal rules likely will result in an oak regeneration failure.



These two rules contain the following caveats that are equally as important:

- Regenerating oaks becomes more problematic as site quality improves. Once oak site index exceeds 65 feet (an intermediate site), competition from other vegetation becomes intense and it is difficult to regenerate an oak forest.
- High densities of small oak seedlings are necessary to obtain large oak advanced regeneration on high-quality sites because of substantial oak mortality rates.
- The key to growing small oak seedlings to large oak advanced regeneration is to manage their root development by controlling understory shade and protecting from deer browsing.



Thank You