

Forestry

Teacher Training for Envirothon
Grand Island, January 8, 2018



Nebraska
Forest
Service



Silviculture:
Assessment and Management

Assessing the Forest

- Identify tree and forest plant species, age and condition
- Assess tree and forest health issues and concerns
- Determine tree tolerance to shade
- Determine silvicultural practices
- Apply treatments in timely manner

Managing Forests

- Silvicultural practices
 - Clearcut, shelterwood, seed tree
 - Group selection, single tree
- Treatments
 - Plant, fertilize, burn
 - Thin, prune

Definition: Silviculture

- *Silviculture* is the art and science of managing the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse goals and values of landowners as to the income from logging & timber, wildlife habitat, water quality, forest restoration & improvement, and recreation or any other value a forest is capable of providing on a sustainable basis.

Definition: Silviculture

- A silvicultural prescription is a planned series of treatments designed to change current structure and composition of a stand to one that meets management goals. The prescription normally considers ecological, economic, and societal objectives and constraints.

Definition: Silviculture

- Silvicultural methods include site preparation, planting, fertilizing, prescribed burning, thinning, pruning, and harvesting
- Intermediate treatments (thinning, pruning) are designed to enhance growth, quality, vigor, and composition of the stand after establishment or regeneration and prior to final harvest
- Regeneration treatments (harvesting) are applied to mature stands in order to establish a new age class of trees: even-aged, and uneven-aged will be addressed

Basic Silviculture Framework

- Understanding the forest tree species, *shade tolerance* and *shade intolerance* determines the method of treatment:
 - Tolerance to shade – species growth and harvest is within shade
 - Intolerance to shade – species growth and harvest is without shade
 - Intermediate – tolerance to shade and sun

Tolerant Species

- These trees grow into an existing canopy, under shade; they are not the first to colonize open areas.



Intermediate Species

- As the name implies, these trees have characteristics that are “in between” tolerant and intolerant species



Intolerant Species

- Intolerant species are generally the first to establish after a disturbance -- a harvesting clearcut or major fire which opens the canopy
- These trees are often called *pioneer species*



Example 1: Western U.S.

- Intolerant

- western larch
- ponderosa pine
- lodgepole pine

- Tolerant

- western hemlock
- giant sequoia
- sitka spruce



Example 2: Eastern U.S.

- Intolerant

- eastern cottonwood
- Kentucky coffeetree
- yellow poplar

- Tolerant

- sugar maple
- basswood/linden
- black spruce

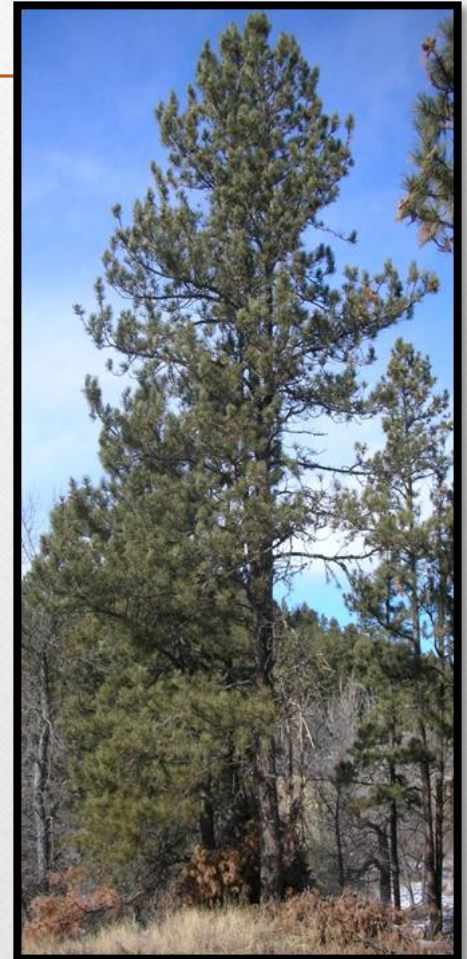


Dave Powell, USDA Forest Service

Nebraska Forests and their Trees

- Where are Nebraska's significant forests?
 - ponderosa pine forests
 - eastern hardwood forests
 - riparian forests

Nebraska Forests and their Trees



Silviculture: Practices & Treatments

Main silvicultural systems

Even-aged systems

- [clearcut](#)
- [patch cut](#)
- [seed tree](#)
- [shelterwood](#)
- [coppice](#)
- [retention system](#)



Even-aged stand

Uneven-aged systems

- [single tree selection](#)
- [group selection](#)



Uneven-aged stand

Even-aged vs. Uneven-aged Management

- Your management goals and the shade tolerances of the species involved will determine whether to manage as an even-aged or uneven-aged basis
 - Intolerant species....even-aged management
 - Tolerant species uneven-aged management

Even-aged Management: Shade Intolerant Species

- The goal is to remove enough of the canopy to allow sunlight to reach the forest floor; intolerant species to regenerate
- All trees in the stand are the same age
- Used for intolerant species



Even-aged Management

- Rotation is the length of time a stand grows until it is harvested.
- The site is regenerated for the next crop of trees by planting seedlings or leaving seed bearing trees.



Even-aged Management

Even-aged management options include:

- Clearcutting: removing all trees
- Shelterwood systems: leave 20+ trees per acre
- Seed tree: leave a few or several seed trees standing per acre

Even-aged Management: Clearcutting

- All trees are cut, leaving a large open space with full sunlight for new seedlings



Even-aged Management: Shelterwood

- 20 or more trees per acre are left on site to provide some shelter for seedlings for the first few years
- This stand has been opened up sufficiently for sunlight to reach the forest floor for the entire day



Even-aged Management: Seed Tree

- A few to several healthy and heavy seed trees per acre are left to provide seed for the next crop
- The seed tree harvest unit acts as a clearcut, but with natural regeneration from trees in the original stand



Uneven-aged Management: Shade Tolerant Species

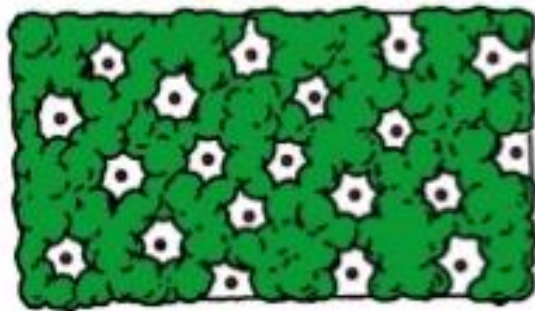
- The goal is to remove only enough of the canopy to allow shade-tolerant species to regenerate
- Multiple age classes
- Used for shade tolerant species

Uneven-aged Management

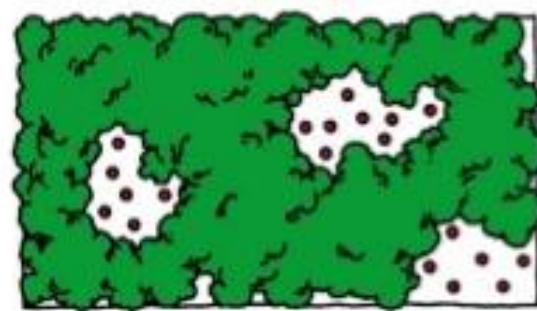
- Intermediate aged or mature trees are cut singly or in small groups:
 - Reduces crowding
 - Encourages growth
 - Maintains uneven growth

SELECTION

Single-Tree



Group



Uneven-aged Management

- Group selection systems: small areas are harvested
- Single tree selection systems: individual trees are harvested



Uneven-aged Management: Group Selection

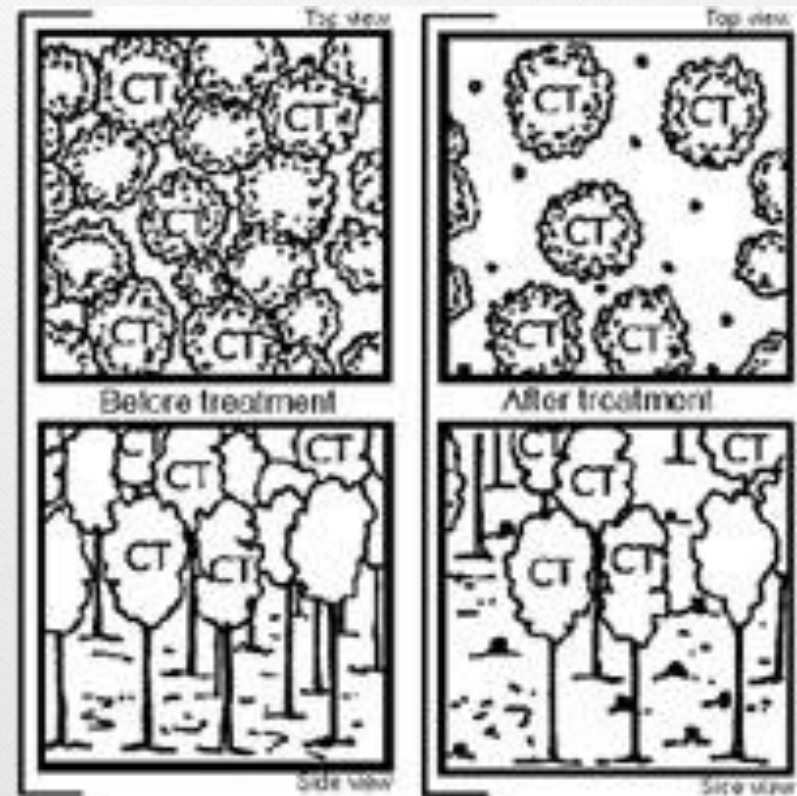
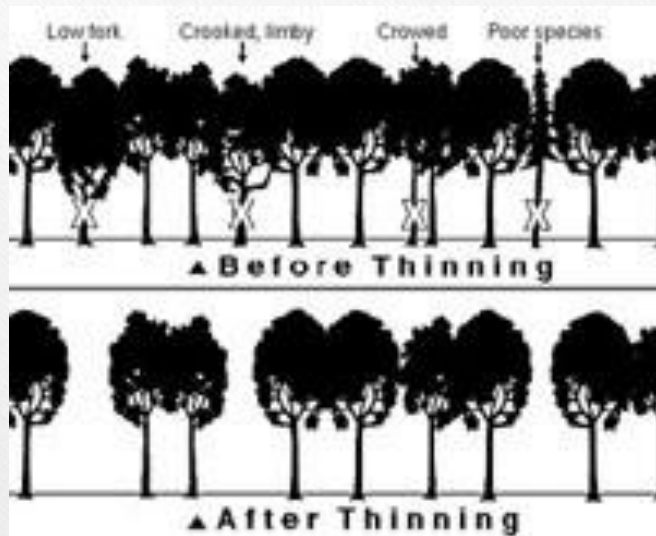
- Group selection harvests are small clear-cuts, with the diameter of the opening less than two times the height of dominant trees in the adjacent stand



Uneven-aged Management: Single Tree Selection

- As the name implies, single trees are removed which creates only small gaps with minimal additional light reaching ground level
- This technique favors the very shade-tolerant species

Crop Tree Selection: Black Walnut



Applying Silviculture

- Determine your goals for your forest
- Evaluate existing conditions in the forest
- Decide what treatments can help you reach your goals
- Implement treatments at the right time

Treatments: Planting

- Seedlings are available through the NRDs and wholesale nurseries



Treatments - Fertilization



Treatments: Prescribed Burning

- Burning periodically can reduce unwanted tree competition and weeds in some places



Treatments: Thinning

- Thinning opens a dense stand, resulting in larger crowns and more leaves; producing greater diameter growth
- Thinning can also improve forest health and reduce fire hazards



Treatments: Thinning

- Pre-commercial thinning (young stand)



Treatments: Thinning

- Commercial thinning
(older stand)



Treatments: Pruning

- In Nebraska, black walnut is thinned and pruned creating a high-quality, knot-free log with minimal taper



Mel Baughman

Resources

- Resources:
 - <https://www.discovertheforest.org/>
 - <https://www.discovertheforest.org/page/natural-inquirer/>
 - Contact your District Foresters for resources and practical help at [*http://nfs.unl.edu/foresters*](http://nfs.unl.edu/foresters)

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