Applied Forest Ecology: An Introduction to Silviculture

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Thanks to

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Outline

What is “silviculture?”
Values of the forest
Forest structure
Silvicultural systems
Q&A
Definitions of Silviculture

The art and science of controlling the establishment, growth, composition, and health of forests and woodlands to meet the diverse needs of landowners and society on a sustainable basis.

(J. Helms 1998)
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Limits of Silviculture

Working with the forces of nature: sailing analogy
Values we derive from forests

Common forest products:
  Timber, game wildlife, recreation...
Values we derive from forests

Common forest products
  Timber, game wildlife, recreation...

Specialty forest products:
  Berries & nuts, birch bark, balsam boughs...
Values we derive from forests

Non-market values:
- Ecological, habitat
- Aesthetics
- Watershed protection
- Spiritual, existence values
Forest Structure
Kraft Crown Classification

DOMINANT – trees with crowns extending above the main canopy — receiving direct sunlight from above and partly from the sides

CODOMINANT – trees with crowns forming the general level of the crown cover — receiving direct sunlight from above but little from the sides
Kraft Crown Classification

INTERMEDIATE – shorter trees with crowns extending into the main canopy—receiving direct sunlight from above but not from the sides

SUPPRESSED – trees with crowns entirely below the main canopy—receiving no direct light from above or from the sides
Age classes and cohorts

**EVEN-AGED:** the difference in age between the youngest and oldest trees does not exceed 20% of the total rotation age.

**TWO-AGED:** stands contain two distinct age classes.

**UNEVEN-AGED:** stands contain at least three distinct age classes.
The toolbox
The toolbox

Clearcut harvesting
“Selective” or partial harvesting
Prescribed burning:
  to control understory competition
  to prepare a cleared site for planting
  to favor natural regeneration of desired species
  to reduce fuel loads
Planting of desired species and/or genetically improved stock

Protecting stands from damage from wildlife (deer!)
Thinning at various times in the rotation
Pruning:
  to improve log quality
  to reduce disease effects
Spraying herbicides or pesticides
Cutting to reduce insect threats
Salvage cutting
Fire suppression
And more…
Silviculture $\neq$ Harvesting

A silvicultural system applies to the whole rotation.

A harvesting system applies only to the harvest.
Silvicultural Systems

Clearcutting
Seed tree
Shelterwood
Group selection
Single-tree selection
Intermediate treatments
Clearcutting Method

Clear all vegetation
Prepare the site
Plant trees (generally)
Spray herbicide to control competition
Thin (generally)
Clearcut, and start over
Seed Tree Method

Start with a mature stand
Harvest all but a few large trees per acre of desired species to drop seed
Retain or remove seed trees
Thin, etc
Harvest
Seed tree: Before

(Wisconsin DNR image)
Seed Tree: After
Shelterwood Method

Start with a mature stand

Partial harvest
   New seedlings are established

Remove canopy, "release the advance regeneration"
Shelterwood: mature hardwood stand before any treatment
Shelterwood: After first cut
Shelterwood: After first cut, 5 years later
Shelterwood: After overstory removal
Selection System

Start with mature stand

Remove single trees or small groups

Repeat as needed
Single tree selection: Before
Single tree selection: After
High-Grading

Treatment occurs when landowner is strapped for cash
Best trees removed, worst left, with little consideration for regeneration
Future of the stand?
Highgrade: Before any treatment

(Wisconsin DNR image)
Highgrade: After treatment
Intermediate Treatments

Timber Stand Improvement (TSI)

Thinning
  Pre-commercial
  Commercial

Salvage cutting
Sanitation cutting
Low fork
Crooked, limby
Crowded
Poor species

△ Before timber stand improvement

△ After timber stand improvement
A crop tree before release.

A crop tree after release.
Thinning (red pine)
More on Timber Stand Improvement (TSI)

When choosing trees to cut, pay attention to:
- Tree form
- Crown class
- Desired future condition of stand
How to get it done

Long view
Work with a professional forester
May need to invest
Ask around!
Review

Art and science: be creative!

Desired future condition?

Work WITH nature

Many different options
Questions?

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