Timber Stand Improvements
TSI

Old Edition       New Edition
Cleaning/Liberation  pgs. 147-156  443-444
                    455-457
Salvage/Sanitation  pgs. 475-480  611-614
Pruning ---         pgs. 57-57    424-440

FWF 312: Silviculture

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What is TSI?

• Operations conducted after stand initiation
  and prior to the regeneration cut.
• Goals
  — Enhance Growth
  — Enhance Vigor
  — Improve Quality
  -- Control Composition

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Why do TSI?

• Most commercial species grow at slower rate
  initially than established brush/sprouts.
• The better the site quality, the greater the
  competition between species.
TSI Operations

- Release Operations
  - Weeding, Cleaning, and Liberation Cuts
- Stand Improvement Operations
  - Salvage and Sanitation Cuttings
- Wood Quality Improvements
  - Pruning
- Site Improvement Operations
  - Fertilization, Irrigation, Prescribed Burning

Release Objectives

- Protect young trees from suppression.
- Improve species composition in young communities.
- Reduce crowding of desirable species in dense stands.
- Enhance growth and development of select species.

Weeding

- Post-regeneration establishment; during seedling stage.
- Reduces herbaceous density
- Operations:
  - Mechanical
    - Grubbing or hoeing
  - Chemical Application
    - Basal or Foliar spraying
Cleaning

- Used during the sapling stage to free selected trees from competition
- Remove undesirables and poorly formed trees
- Material removed is of comparable or same age class

Liberation Cuts

- Similar to Cleaning (not past sapling stage) yet fewer trees removed and from an older age class.

Release Results

- Increased volume (300% in Texas study - pine)
- Increased height (56% in Norway spruce)
- Improved survival (73% in Douglas-Fir)

- All varies with regard to site quality, species involved, and intensity of treatments. The purpose is to relieve competition and improve growth and survival
Improvement Operations

- Conducted in stands past the sapling stage in an effort to improve composition and quality of the stand.
- Can be used on any species or age combination.
- Not an effort for regeneration.
- Primarily used in neglected or mismanaged stands

Salvage Cuttings

- Used to remove killed trees or those in danger of mortality
- Utilizes material which otherwise would have been lost.
- Improves stand health by removing diseases or pests.

Salvage Cut Types

- Simple Salvage
  - Removal of dead trees
  - Not many decisions to make
  - Common after fire, ice, wind, and insects
  - Requires artificial regeneration to replace due to lack of seed trees
- Pre-salvage
  - Not common in South
  - Uses classification scheme to predict anticipated losses before next cutting cycle.
  - Based on tree form and vigor.
Sanitation Cuts

- Differ from Salvage with regard to being a precautionary mechanism — before attack or infestation
- Improves health by stopping or reducing the buildup of pathogens.
- Simply cutting low vigor trees does not qualify. Must examine potential financial losses of affected species.
- Example: gypsy moth front is predicted to be in area within time

Sanitation in the South

- Recommended control technique for southern pine beetle.

Remember!

- There is no substitute for a thorough understanding of the life history of the invasive species/pathogen.
- Both methods (salvage or sanitation) must be implemented without delay to re-establish trees/vegetation on a site.
Wood Quality Operation

- Pruning
  - Ideal for large product rotations
  - Saw-logs and veneer logs
- More common in Europe and Australia
  - Evidence in Washington on Weyerhaeuser land
- Success rests on ability to select proper trees and keep them growing at a good rate to rotation.

Natural Pruning

- Death of limb caused by shading and density.
- Shedding of limbs by saprophytic fungi
- Occlusion of limb stub depending on diameter growth rate.
- Tight (live limb) vs Loose (dead limb) Knots

Why Prune?

- Speeds up natural process
- Produces maximum proportion of clear lumber
- Produces tight knots
- Prevents disease
- Reduces fire hazard
- Easier to work in, pleasing appearance
Pruning Effects on Tree

- Growth
  - Can be reduced if photosynthetic surface is greatly reduced. Should maintain a live crown of at least 33%
  - Diameter growth more affected than height.
  - Form Class ----- Bole Taper also affected

- Other Factors
  - Wound Healing
  - Pitch Pockets
  - Rot
  - Epicormic Branches

How to Prune

- Prune to LCR of 33% to 50%
- Cuts flush with bole; no stubs left.
- Remove all dead branches and live branches to 2" diameter. Why not larger? More difficult to heal over (diameter growth)
- Most prune only first 12 to 16 feet
- Prune in dormant season to prevent damage and insect problems.

Considerations

- Number of trees to prune ----- final crop trees? Do not prune trees that will eventually be cut in intermediate operations (not cost effective)
- Crown class and diameter of trees ----- after crown differentiation has occurred
- Growth Rate ----- faster growing trees of the more valuable species
- Site and Age ----- young stands & better sites
Returns from Pruning

- Positive returns (4-7% on investment, but labor intensive)
- Returns increase with addition of thinning.
- Thinning can be heavier than otherwise possible with some species.
- Keep records (photographs) of pruned stands to receive full value of clear material.
Intensive Management

- Fertilization and irrigation not practiced much in TN because of upfront costs and few shorter rotation products
- Fertilization is a common practice in shorter rotations because the growth response pays for itself and dollars/value of money is returned quickly
- Might be attractive if energy becomes expensive and biomass prices escalate --- fiber farms
Intensive Management

- Prescribed Burning

  Primarily used in wildlife management for browse, herbaceous vegetation and forbs

  Can be used to control competing vegetation to some extent (sprouting still occurs)

Summary TSI

Benefits

1. Controlling competing vegetation
2. Anticipating an insect or disease problem
3. Utilizing down or dead material (salvage)
4. Improve present stand conditions and molding the stand for desirable future growth & development