Silviculture of Mixed Stands

Mixed Stands --- 2 or more species growing in intimate association.

Silviculture is much more complicated than for pure stands

Why?

Silviculture of Mixed Stands

Kinds of Mixed Stands

a. Single canopied ---- 2 or more species in which crown canopies are at the same level

b. Stratified ---- Species do not grow at the same rate, allows for different strata

Silviculture of Mixed Stands

Single Canopied Stands

Occurs when species have about the same growth rate or if one species grows faster, but is shorter lived so that when it breaks up, the other species form a single canopy
Silviculture of Mixed Stands

Single Canopied Stands

Examples:
• Mixed conifers in NW ---
• Spruce-fir in NE
• Loblolly-Shortleaf
• Hardwoods when overstory of intolerants are removed --- What kind of trees?

Silviculture of Mixed Stands

Stratified Mixtures

Generally occur when one species grows faster than another and different strata form and
When tolerant species become established below another species
Number of strata is 2 or more

Silviculture of Mixed Stands

Stratified Mixtures --- Even-Aged

Very common occurrence in many forest types --- DF/western hemlock, mixed pine-hardwood, mixed hardwoods
Silviculture of Mixed Stands

Stratified Mixtures --- Even-Aged

Because of the appearance, i.e., mixed nature and occurrence of different strata, the tendency has been to call most mixed stand uneven-aged, but not so. Most hardwood stands are \textit{even-aged or two-aged}.

Silviculture of Mixed Stands

Stratified Mixtures --- Uneven-Aged

- By strata --- intolerant over tolerant
- Within strata --- mixture of tolerants
- Can have both in the same stand

Silviculture of Mixed Stands

Diameter Distribution

- Stand Basis --- typical even-aged and uneven-aged curves
- Strata Basis --- bell shaped within the even-aged or even-aged curves
Silviculture of Mixed Stands

Importance of different strata

- Upper --- intolerant, most valuable
- Mid --- more intermediate, almost continuous cover
- Low --- most tolerant, least value

Silviculture of Mixed Stands

Origin of Mixed Stands

- Old Fields --- leads *ultimately* to mixed uneven-aged stands --- usually a stratum of an intolerant species followed by encroachment of tolerant species underneath ---- *in the absence of disturbance!*

- Clearcut --- leads to mixed, even-aged stands. All stems get the same start. Stratified arrangement due to differential growth rates of different species
Silviculture of Mixed Stands

Origin of Mixed Stands

Planting --- Not enough work done to make summaries or generalizations

Species and site differences --- interplanting and enrichment planting effects

Silviculture of Mixed Stands

What Determines Occurrence?

Climate and Site

In general, the better the site and the more favorable the climate (temp and rainfall), the greater diversity of species will occur

Silvicultural Treatments in Mixed Stands

Recommendations must be made on an individual stand basis

Main problem is control of composition

No problem to get regeneration, just to get desired species
Silvicultural Treatments in Mixed Stands

Mixed Pine/Hardwood

1. Generally intermediate treatments (thinnings, improvement cuts, etc.) designed to favor pine. Release work through injection, spraying, fire, etc.

2. Most pine sites are not good hardwood sites

Silvicultural Treatments in Mixed Stands

Mixed Pine/Hardwood

3. Mixed pine/hardwood stands are intermediate in succession and difficult to maintain in mixtures. Why?

4. Option to regenerate completely to pine or manage as mixed stand. Regeneration will include site prep & hardwood control

Silvicultural Treatments in Mixed Stands

Mixed Pine/Hardwood

5. Possibility of a two-tiered stand

6. If managed as mixed stand, not too concerned with proportion of composition
Mixed Hardwood Stands

Treatment will depend on age and condition of the stand

Necessity for a survey or cruise

• TSI --- cuts necessary to release intolerant species to form upper canopy
• Unmanaged or degraded stands --- objectives, costs, biology, decision-making
• First cut in unmanaged stand is a combination improvement cut and thinning --- species & form

Regeneration ---- Convert to pure species or manage as mixed
Factors --- species of value, response to release, advance regeneration, undesirables, weeding
Silvicultural Treatments in Mixed Stands

Mixed Hardwood Stands

• Problem is how to get former upper canopy back
• Regeneration mechanisms
• Usually results in some form of shelterwood. WHY?

Silvicultural in Mixed Stands

Advantages

• Production of quality trees in upper stratum
• More resistant to damage from biotic agents
• May or may not be more resistant to outside damage (wind, fire)
• Total stand production is usually greater.
• Wildlife Considerations

Silvicultural in Mixed Stands

Disadvantages

• Complications in controlling species composition, especially at time of regeneration
• Woods operations more difficult
• Tendency to high-grade and not understand biological principles
Silvicultural in Mixed Stands

Comparing pure to mixed stands

- Conifers will often out produce hardwoods
- On better sites, a choice can be made between pure and mixed with little ramifications
- Considerations other than fiber production may be important for maintaining mixed stands
- Conversion? --- cost and justification

Silvicultural in Mixed Stands

General Comments

1. Extremely complicated and no fixed silvicultural practices. Each owner is different as to what he wants and does. Silviculture, or the lack of it, at present is largely determined by markets and economics

Silvicultural in Mixed Stands

General Comments

2. Harvesting has largely been a matter of high grading so that most stands have deteriorated with the upper story having a few trees of desirable species and the lower stratum largely undesirable. This is common when single tree selection is applied without making provisions for regeneration
3. Most silvicultural treatments are applied to improve existing stands — thinnings, removal of overmature trees, removal of undesirables, etc. — correct existing conditions.

4. As far as regeneration is concerned, it is a matter of wait and see, hoping for improvement of market for material that now has low value. It is difficult to insure that next stand will have favorable proportion of desired species.

5. Thus, your role as a silviculturist is to implement the best biology available within ownership and economic constraints. Often you only have one opportunity to provide silvicultural corrections — often associated with a timber harvest.
### Silvicultural in Mixed Stands

#### General Comments

6. Some degree of movement towards desired future condition should be considered a success. Does the next forester encounter a condition that is better than what you are faced with now?

---

### Silvicultural in Mixed Stands

#### Future Prospects

- Augmenting natural regeneration through planting
- Degree of intensive silviculture will depend on markets and costs
- If a variety of species can be marketed, then natural regeneration is less of a gamble
- Increased use of herbicide technologies to remove unwanted vegetation and free more desirables

---