Two Age System in Eastern Hardwoods

- Perpetuates 2 age classes composed of:
  1. younger regenerating class
  2. Older reserve trees (10-30 ft²/acre)

Two Age System

- Known in literature as:
  1. Deferment cuts
  2. Irregular shelterwoods
  3. Shelterwood with reserves

Advantages

- Visual – first and primary use as an alternative to clearcutting
- Ability to regenerate intolerant/intermediate species
- Provide structural diversity
- Develop large, high-value stems
- Produce multiple product lines
- Maintain sexual reproduction
### Disadvantages

- Reserve tree candidates may not be present
  - Short-lived
  - Potential tree grade
- Aspects of forest fragmentation are present
- Ability of timber harvest operators
- Impact on mating system

### Requirements of Reserve Trees

- 10 to 30 ft²/acre of basal area
- Commercial species and long-lived
- Potential tree grade of 2 or greater
- Ability to maintain tree grade
- Ability to withstand harvest
- Located to avoid windthrow
- Seed production ability
- Crown vigor rating
  1. Live crown ratio
  2. Visual crown rating system

### Factors for Consideration

- Initial regeneration and development of advanced regeneration
- Reserve tree performance
- Harvest damage
- Post harvest mortality and damage
- Seed production
- Development of two age guidelines
Guidelines for Reserve Tree Selection

- Minimum Value
- Maintenance of Quality
- Ability for Additional Growth

- Maintenance of Butt Log Quality
  1. Epicormic Branches
  2. Harvest Damage
  3. Crown Classes / Vigor / Growth

Guidelines for Reserve Tree Selection

- Harvest Damage
  a. Operator
  b. Felling and Skidding Damage
  c. Topographic position --- slopes, exposed areas, moist areas
  d. Windthrow at post harvest

Guidelines for Reserve Tree Selection

- Harvest Damage

  Felling damage more severe than skidding
  (depends on operator)

  Thin soil areas, noses and bottom of drainage exhibited more knockdown

  One Possible Solution ---- leave trees in groups instead of isolated trees
Typical Clear Cut
Stands with little or no advanced regeneration

1st Cut
0 20 40 60 80

- no adv. reg.
- development of low vigor adv. reg.
- acorn production
- mid-story or other release
- 2nd harvest

"Life Boating"
Stands with little or no advanced regeneration

0 20 40 60 80

- no adv. reg.
- development of low vigor adv. reg.
- acorn production
- mid-story or other release
- 2nd harvest
To Explore the Regenerative Capacity of White Oak Reserve Trees

1. Acorn production: Could relatively small sawtimber sized white oak reserve trees maintain or increase acorn production after release

2. Advanced Regeneration Development: Could white oak reserve trees initiate the development of advance regeneration?

Study Area

- Eastern Kentucky
- 12 stands --- 60 to 90 years of age
- Site index range from 65 to 85 for upland oak
- Stands stratified by site index and 3 treatments with 4 replications

Methods

- 3 treatments
  - 20 reserve trees per acres
  - 35 reserve tree per acres
  - Untreated control
- Reserve Tree Criteria
  - White oak
  - Codominant
  - Potential tree grade of 2 or better
  - Live Crown Ration > 35%
Summary for Acorn Production

- Full release of white oak trees can moderately increase acorn production
- A small number of trees contribute to the majority of acorn production
- Abundant producers are fairly consistent year to year
- Selecting prolific producers can be advantageous to reaching mast production goals

Summary

- Two-age system could be used to lifeboat white oak in stands where adequate advanced regeneration is not present at the time of harvest — 5 year results
- Reasonable regeneration treatment for private landowners
- Time element ???

Two Age Summary

- 15 to 30 ft/acre basal area retained
- Long-lived species
- Codominant crown class or perhaps vigorous intermediates
- Topographic position of reserves — avoid thin soils
- Maintain stem quality / tree grade
- Logger buy-in to reduce logging damage
- System has potential to develop advance regeneration
- Time element
- Expense of management, control of undesirables