NC STATE UNIVERSITY College of Natural Resources

Managing the Right Species on the Right Site- Part 2

Jameson Boone – NC State Extension
Forest Management Specialist
jdboone3@ncsu.edu

1

NC STATE UNIVERSITY College of Natural Resources

Land Use History

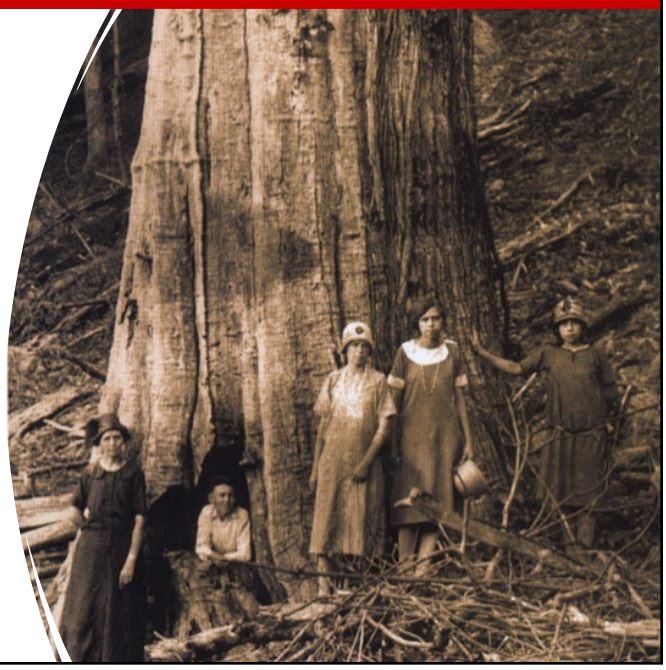
- Prior to European settlement
  - Low, regular fire used to clear land for agriculture, hunting, and to favor edible plants
  - Mix of open grasslands, and both open and closed fire-tolerant pine and hardwood forests
  - This made fire and disturbance adapted species

2

NC STATE UNIVERSITY College of Natural Resources

1600s-1880

- Convert to Agriculture
- Wood was used for primarily for heat
- Prescribed fire was used to clear land.
- Harvesting was seen similar to mining



3

NC STATE UNIVERSITY College of Natural Resources

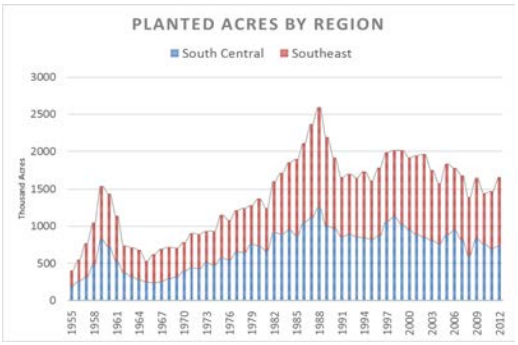
1880-1940

- Wood utilization increased with industry.
- Unsustainable land clearing and logging practices
- Chestnut blight
- Very few original or “virgin” forests left

4

1940-1970s

- Smokey the Bear
- Federal Assistance Program
- Tax Deferment Programs



5

Today

- 1970s-Present

  - Tree improvement programs
  - Forest cover has stabilized – Lots of overmature hardwoods
  - Emerald ash borer
  - Forest Fragmentation
  - Changes in landowner types
  - New products and market changes

6

NC STATE UNIVERSITY College of Natural Resources

Current Practices

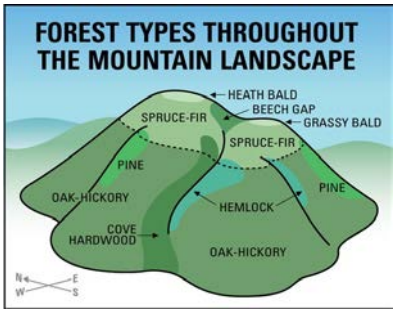
- Focus in on management for future stands.
- Timber industry is reliant on landowners to make proper land management decisions
- 82 % private, 65% non-industrial

7

NC STATE UNIVERSITY College of Natural Resources

Things to Remember

- Hardwoods are very site-specific - Slope and landscape position matter.
- Planning should be years done prior to a harvest in some cases.
- Consult a forester before making decisions



8

NC STATE UNIVERSITY College of Natural Resources

How to start- Management plan and inventory

- Management plans should have species, size, quality, and productivity of trees
- Evaluate the plan: Have your forester explain why and how the project will get done.
- Have an inventory done to know management options.

9

NC STATE UNIVERSITY College of Natural Resources

Questions to ask to a Forester

- What is the budget and timeline for project
- How likely is it that this will succeed?
- What are cost-share options?
- What is the timeline for future management?
- Call your Extension office or NCFS office if you have questions.

10

NC STATE UNIVERSITY College of Natural Resources

Considerations

- Will the tree grow back from seed stump sprout?
- Does it need full sun (shade intolerant)
- Or can it handle some shade (shade tolerant)

11

NC STATE UNIVERSITY College of Natural Resources

Other considerations

- What is the long-term plan for management?
- Do you plan on thinning? Improved wildlife habitat? Or just letting it grow?

12

Commercially Valuable Species- Tree species to manage for lumber.

Shade Intolerant Species	Intermediate Tolerant Species	Shade Tolerant Species
Loblolly pine	White oak	Sugar Maple
Shortleaf pine	Black oak	
White pine	Northern red oak	
Longleaf pine	Scarlet oak	
Yellow-poplar	Chestnut oak	
Tupelo	Cherrybark oak	
Cypress	Southern red oak	

13

Management Decisions

We are going to go over:

- Harvest types
- Options for either replanting or allowing the stand to regenerate without planting

14

NC STATE UNIVERSITY College of Natural Resources

Harvest Conserations

- Aesthetics: Think about what the stand will look like in 5-10 years
- What species you want to favor.
- What is practical for your site- Size of the forest stand, accessibility, quality of trees

15

NC STATE UNIVERSITY College of Natural Resources

Wet Area Considerations

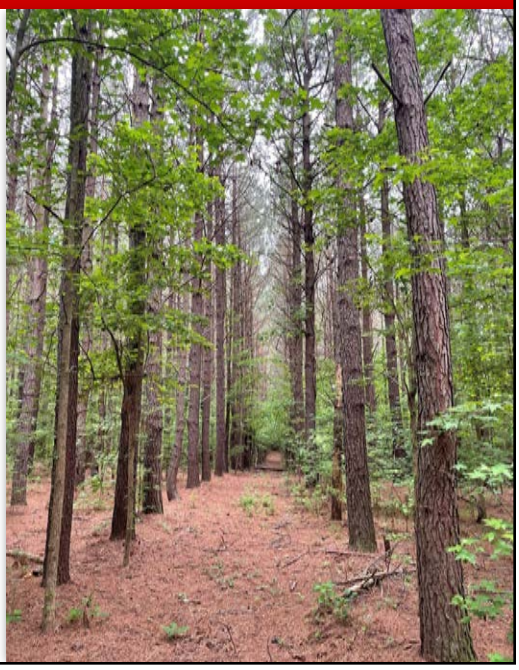
- Rutting
- Time of year and ground conditions matter

16

NC STATE UNIVERSITY College of Natural Resources

Even-aged Systems

- Age difference is less than 20% of the rotation
- Favors intermediate to shade-intolerant species



17

NC STATE UNIVERSITY College of Natural Resources

Clearcut

- Removes all timber in one cutting
- The most economical for most situations
- May or may not be the best for your objectives

18

NC STATE UNIVERSITY College of Natural Resources

Clearcut harvest- Pros

- Produces the most income (in most situations)
- Allows for tree planting or natural regeneration (in some cases)
- Allows poor quality stands to be cleared converted to better/faster growing trees

19

NC STATE UNIVERSITY College of Natural Resources

Clearcutting Cons

- Poor aesthetic quality
- Poor timber harvest leaves poor-quality trees
- Does not work for oak management

20

Seed-tree Harvest

Similar to clearcut harvest

Retains a few trees to provide seed for the next stand

Works well for silvopasture

21

Seed-tree harvest

- Works for pine only
- Must be on the right site for shortleaf and longleaf
- High aesthetic quality
- May require additional work – precommercial thinning

22

Shelterwood Harvest

- A multistep process that starts before you cut.

23

Is shelterwood right for you?

- Do you have understory trees that can resprout?
- If not, can you clear the understory and encourage new trees to grow?
- Oaks need some shade to get established
- Underplanting a possibility

24

NC STATE UNIVERSITY College of Natural Resources

Shelterwood- Stage 1, Understory removal

Harvest most or all understory trees + a few overstory trees

Allows new oak seedlings to establish

If few pulpwood markets, can be done with herbicide

Hack and squirt works well- Kill all low value trees up to 12”

Basal bark spraying works too

25

NC STATE UNIVERSITY College of Natural Resources

Shelterwood stage 2

- 1st commercial harvest
- Only done with stand has desirable trees to regenerate
- Residual trees provide some shade, acorn production
- Disturbance will cause trees to resprout

26

NC STATE UNIVERSITY College of Natural Resources

Stage 3- Overstory Removal

- 2nd commercial harvest
- Usually leave a few mature trees behind for wildlife

27

NC STATE UNIVERSITY College of Natural Resources

Follow Up work- 10-15 years later

- Tending stage- Focus on 60-70 best oak trees
- Release 3-4 sides on desirable trees

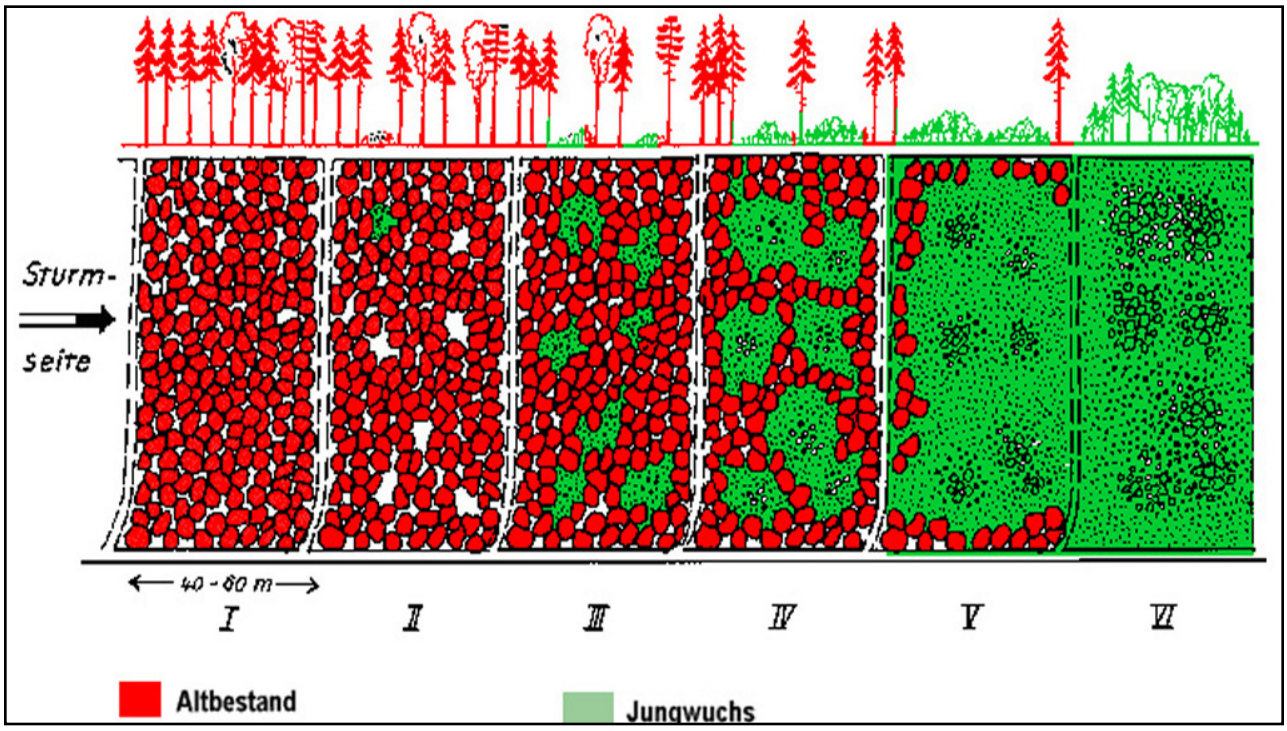
28

NC STATE UNIVERSITY College of Natural Resources

Expanding Gap

- Starts with a gap harvest
- Could be strips or larger (1/2 to 1 acre) clumps of trees
- Understory release should take place between gaps

29



30

Next stage: Expand the gap

- Expand on areas that have the greatest oak regeneration
- Research projects are getting done in Pisgah and state forest service land

31

Aforestation

- Planting from an old field
- Pine typically best option
- Hardwoods possible in certain sites

32

NC STATE UNIVERSITY College of Natural Resources

Old Field Considerations

- Soil Compaction
- Increased deer and rodent damage – especially for hardwoods
- Size of the field for future management

33

NC STATE UNIVERSITY College of Natural Resources

Trees to Plant- Pines

Loblolly Pine- Grows fast and is relatively cheap to replant.

Benefits: Allow for the best genetics to go on a site

Newly planted loblolly are 40-100% faster growing than unimproved

Cons- lack of a pulpwood market in some areas, may need to adjust spacing requirements

34

NC STATE UNIVERSITY College of Natural Resources

Planting loblolly pine

- Spacing: 8 x 10’ or 9 x 10’ if early thinning is an option
- 10 x 10’ or 10 x 12’ if no pulpwood market
- Expect 90% survival

35

NC STATE UNIVERSITY College of Natural Resources

Planting Pine – Seedling options

- Bareroot- Great for loblolly pine, cheap, easy to plant
  - Cons- limited planting window, more susceptible to drought in 1st few months
- Containerized – Wider planting timing, higher survival rate (close to 100%), easier to plant, and works for all pines
  - Cons- more expensive

36

Loblolly Pine *PRS*™

Performance Rating System

Family Code: **AG-88**

PRS™ Ratings — Predicted Family Performance

Productivity Rating **66**

Rust Resistance Grade **A**

Stem Form Grade **A**

The ***PRS***™ ratings indicate that the progeny of family is projected to be:

P = 66 → Approximately 66% greater stem volume at age 6 compared to the combined average of local non-improved loblolly pine checklots across the **Atlantic and Lower Gulf Coastal Plains**.

R = A → **Excellent** for resistance to fusiform rust disease

S = A → **Excellent** for stem straightness

Genetic improvements

37

Tree Planting Challenges

- Drought
- Other natural disturbances (flooding, ice damage, deer damage, insect damage)
- Lack of access to resources for site prep
- Poor site- Compacted soil, shallow, rocky soil
- Other factors- Seedling care and poor planting practices

38

NC STATE UNIVERSITY College of Natural Resources

Mountain Pine options

- **White Pine**- Best in monoculture plantation. Sometimes grown for Christmas trees in the piedmont. Well-spaced white pine branches can be trimmed annually for holiday wreaths. 10x10' spacing common.

- **Shortleaf pine**- Wide Range, grows on poor quality soils. Grows well in mixed pine and hardwood stands. Similar spacings to loblolly pine. 10x10' – 10 x 12' common.

39

NC STATE UNIVERSITY College of Natural Resources

Oak Planting Options

- **Upland Oak-** Large seedlings are better, requires competition control for 3-5 years, can be underplanted. Usually focuses on white oak and northern red oak.

- **Bottomland oak-** Coastal plain option. Focus on nuttel, swamp white oak. Has to be right site that gets only periodically floods (no standing water)

40

NC STATE UNIVERSITY College of Natural Resources

Other hardwoods

- **Yellow-poplar-** Requires full sun, grows on a wide range of sites, poor survival
- **Hybrid poplar and Sycamore-** No current market, typically grown for fiber rotations
- **Black walnut-** Site-specific, not great option for timber, useful for walnut production and niche wood uses

41

NC STATE UNIVERSITY College of Natural Resources

Natural Regeneration Options

- Do you already have the trees you want?
- Are their contractors available for the work?
- Your current stand tells what your future stand could look like!

42

NC STATE UNIVERSITY College of Natural Resources

Regenerate Naturally

Oak

- Advanced Regeneration is required – Tall seedings ideally 5’ tall.
- 200 or more seedlings per acre

43

NC STATE UNIVERSITY College of Natural Resources

Oak considerations

- Medium and poor-quality sites: Shelterwood harvest or expanding gap with herbicides or burning
- High-quality sites: Difficult to manage oak- Could leave residual oak trees for wildlife

44

NC STATE UNIVERSITY College of Natural Resources

Yellow-poplar

- Clearcut harvested is preferred
- Can be selectively harvested
- Grows well in a monoculture or diverse stand, thinning not needed in most cases
- Prefers high quality sites

45

NC STATE UNIVERSITY College of Natural Resources

Natural regeneration for Pine

- **Loblolly Pine-** Regenerates from seed very quickly. Use clearcut harvest.
- **Shortleaf pine-** Requires clearing competition to allow tree to regenerate. Site prep burn ideal
- **Longleaf pine-** Requires the right site. Requires shelterwood harvesting + burning

46

NC STATE UNIVERSITY College of Natural Resources

Pine natural regeneration thoughts

- It is not free – usually requires additional inputs
- Think about goals – restoration vs. timber production

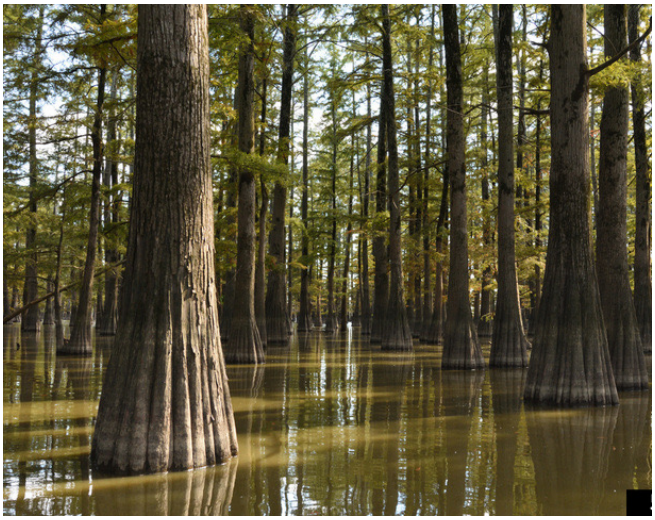
47

NC STATE UNIVERSITY College of Natural Resources

Swamp Species

Tupelo, Cypress, Atlantic white cedar- Regenerate from seed.

Reliant on seed movement to the site or a heavy mast (fruiting) year prior to harvest.



48

Species	Harvest Methods	Regeneration Methods	Shade Tolerance	Rotation Length (years to harvest)
Oaks (white, northern red, southern red, black)	Shelterwood*, Expanding gap*	Need advance regeneration (200+ seedlings) prior to harvesting using seedlings greater than	Intermediate	50–150
Yellow-poplar	Clearcut, Thinning	From seed and stump sprouting	Intolerant	50–70
Pines	Clearcut, Seed-tree harvest	Planting seedlings+ or from seed	Intolerant	20–50
Cypress, Atlantic white cedar	Clearcut, Seed-tree harvest	From seed+	Intolerant	50–150

*Additional forestry activities may be needed including a prescribed fire and/or release of crop trees

+ Site prep may be needed to allow the stand to be planted successfully. Planted stands should be evaluated after 1-2 years for release.

49

Resources

- Accomplishing Forest Stewardship with Hand-Applied Herbicides
- Successful Pine Planting
- NRCS Technical Service Providers- Find on in your area https://nrcs.my.salesforce-sites.com/FindaTSP

50

NC STATE UNIVERSITY College of Natural Resources

Questions?

Jameson Boone- NCSU Forestry Extension
jdboone3@ncsu.edu

51