

An Overview of Bottomland Hardwood Forests



Real. Life. Solutions.

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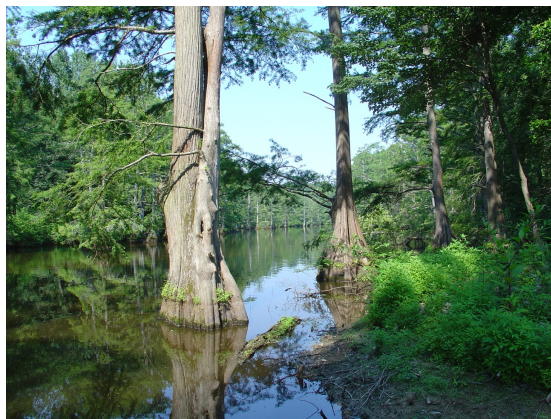
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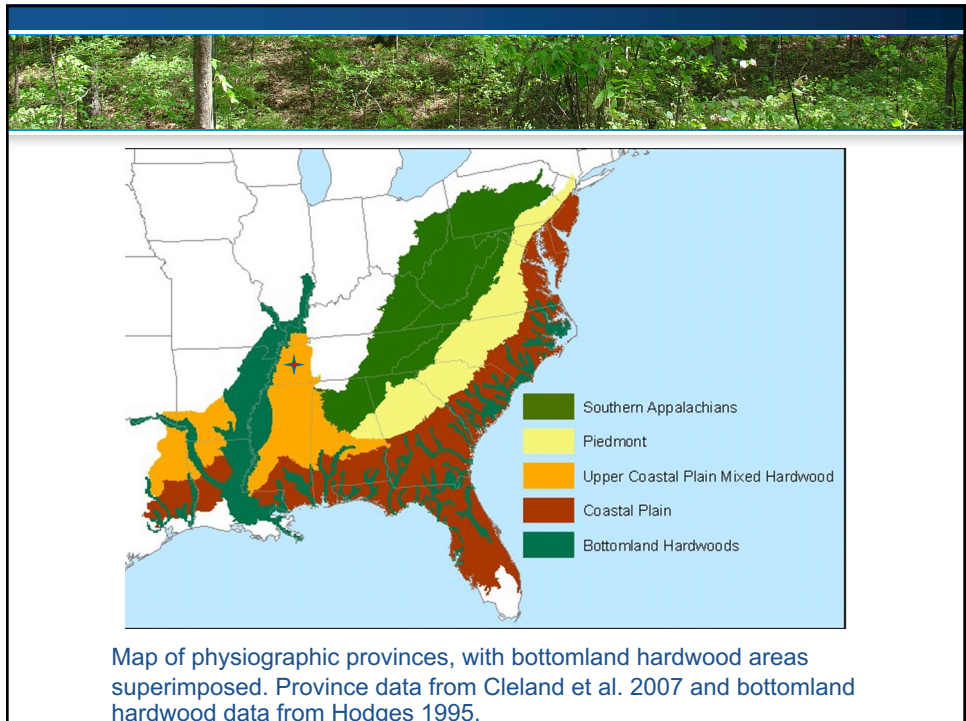
Defining Bottomland Forests

Forests that occur adjacent to rivers and streams in the SE US; sometimes narrow and sometimes expansive.

Some are more hydric than others!



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Historical Loss of Wetlands

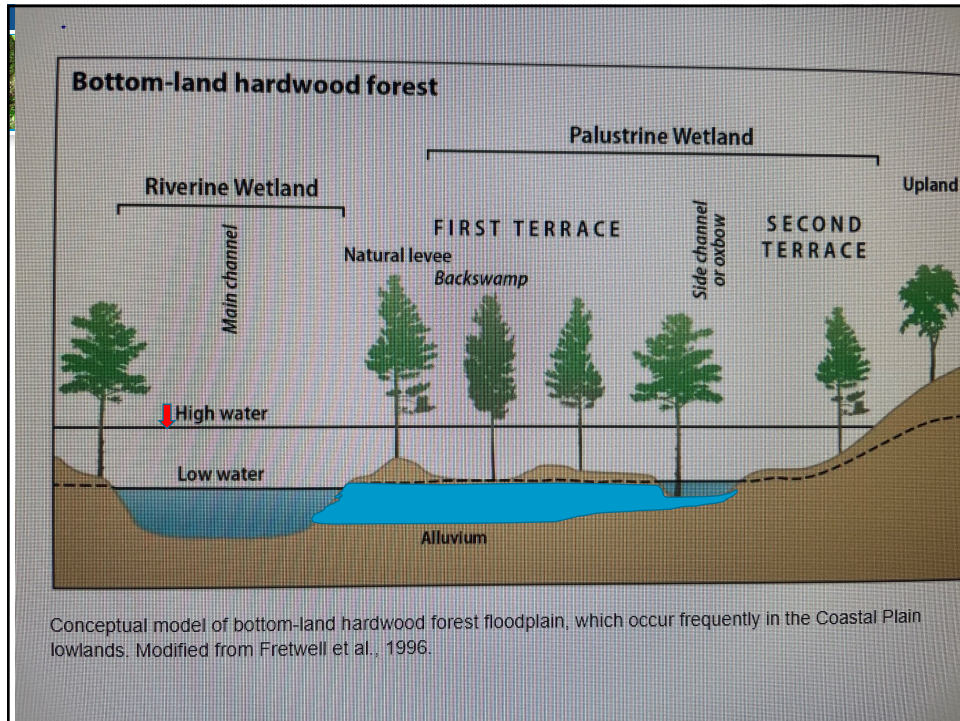
- Farmers were paid to drain wetlands for ag land
- Swamps converted for development

Original Wetland Acres in Lower 48 States
221 million acres

Category	Percentage	Acres
Wetland Remaining by 1980s	46%	104 million
Wetlands Lost by 1980s	54%	117 million

<https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/water/wetlands/>

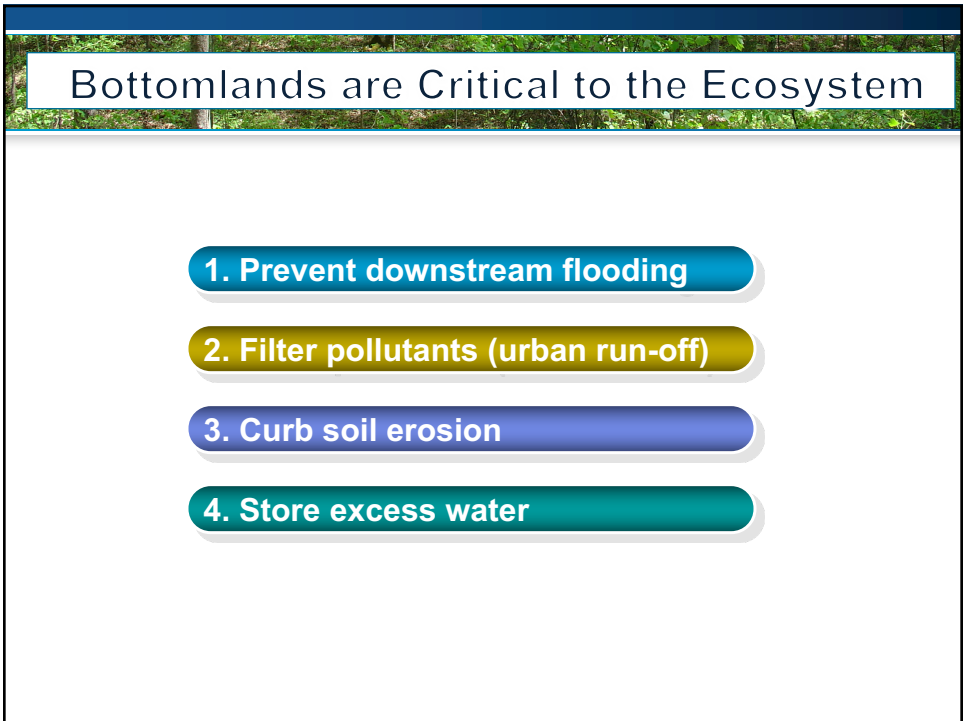
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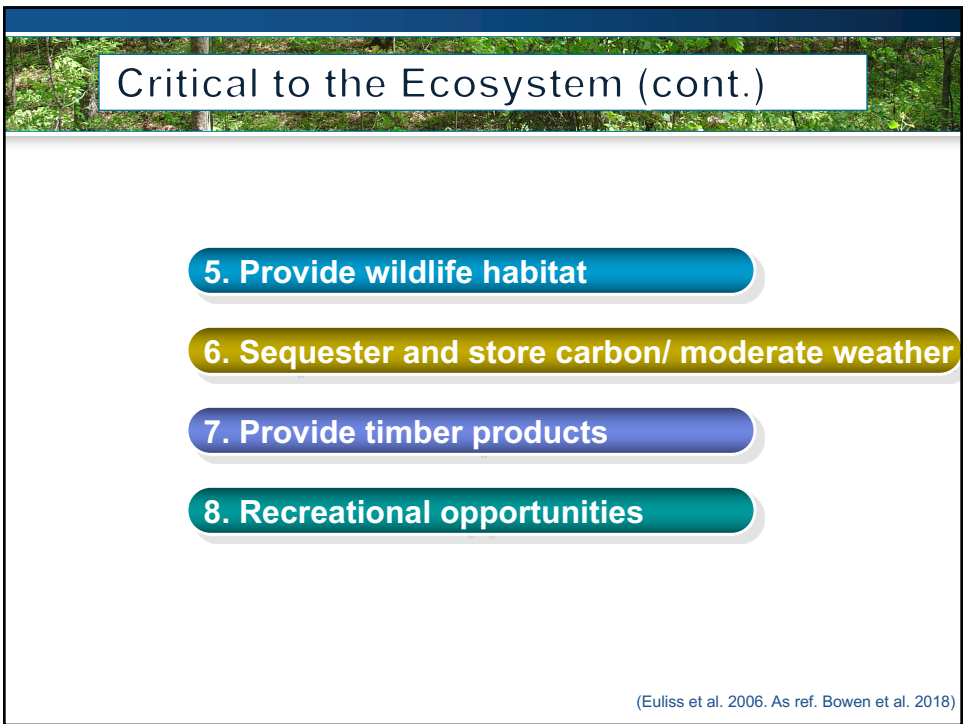
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Bottomlands are Critical to the Ecosystem

1. Prevent downstream flooding
2. Filter pollutants (urban run-off)
3. Curb soil erosion
4. Store excess water

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Critical to the Ecosystem (cont.)

5. Provide wildlife habitat
6. Sequester and store carbon/ moderate weather
7. Provide timber products
8. Recreational opportunities

(Euliss et al. 2006. As ref. Bowen et al. 2018)

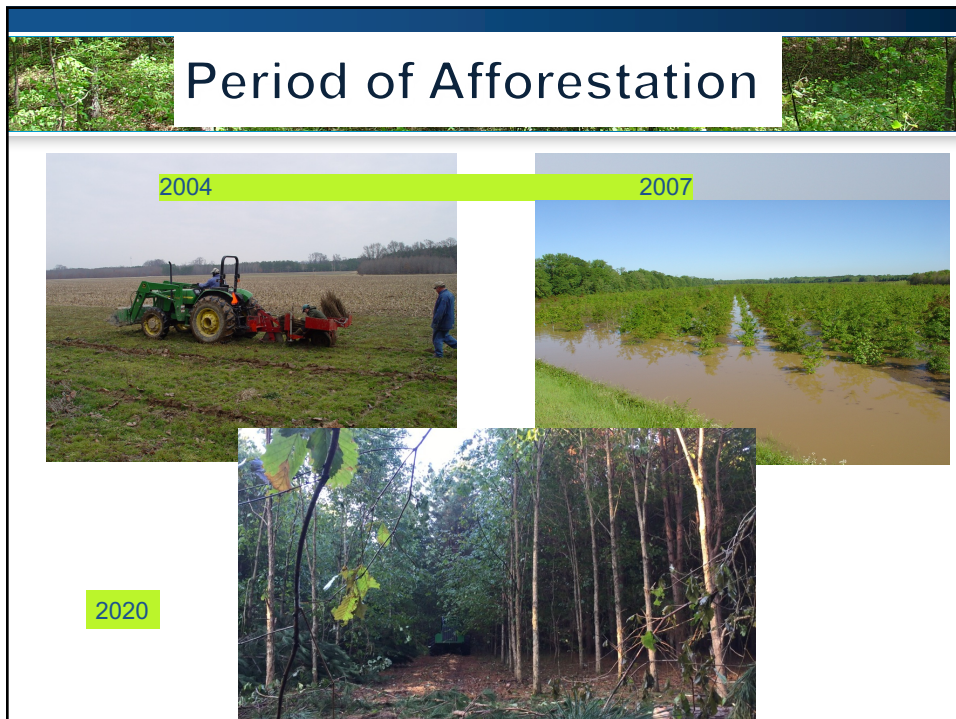
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Modern Treatment of Bottomlands (1980's to Current)



- ☞ Protection and restoration of wetlands
- ☞ CRP/WRP Programs
- ☞ Wetland mitigation

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Home to Hundreds of Tree Species

Value Group \$	Commercial Species
★ High	Cherrybark/Swamp Chestnut/Shumard Oaks; Green Ash and Black Walnut (limited)
★ Medium	Bald Cypress, Red Maple, Sweetgum, Water/Willow/Overcup Oaks, Pecan and Shellbark Hickory
★ Low	Cottonwood, Sycamore, Black Willow, River Birch, Swamp Tupelo, Pin Oak, Hackberry, Boxelder

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Silviculture

Silviculture = “controlling the growth of forest trees”



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Silvicultural Challenges of Bottomlands

1. **Flooding and Poor Drainage** – lack of O_2 is problematic not only for roots, but for microbial activity. Also kills acorns and regeneration.
2. **High Water Table** – like a “liquid hard pan”
3. **Soil Compaction**- 1 cu. ft = 62 lbs.
1 ac. 1ft. deep = 272,000 lbs.
1 ac. 6 ft. deep = 1.6 million lbs.
4. **Diverse Soil Properties (deposition)**


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Soil Mottling

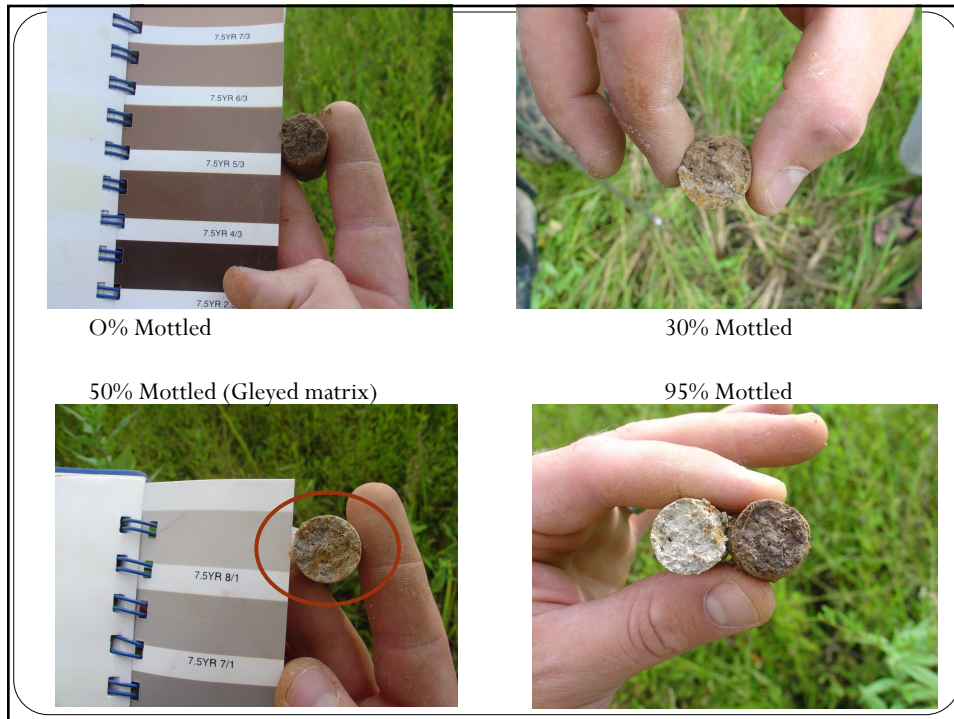
Using the Munsell Soil Color Chart

Soil Mottling- when water is removed very slowly and the soil is saturated during three or more months of the year;

Gleyed matrix - the point where grey mottling becomes so excessive that grey colors exceed 50 percent of the soil profile.



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Summary of oak species selection on bottomland sites based on soil mottling and >50 percent gleyed matrix.

Soil drainage (classes of internal drainage)	Soil mottling (depth to >50% gleyed matrix)	Recommended <u>oak</u> species to plant
Poorly-drained	0 – 9”	Nuttall, pin, overcup
Somewhat poorly-drained	10 – 18”	willow
Moderately well-drained	19” +	water, swamp chestnut, swamp white, Shumard, cherrybark ¹ , bur ¹

Mercker et al., 2006

¹ adapted from Fowells, 1965; Baker and Broadfoot, 1979; Allen et al., 2001; Ozalp et al., 1997

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Extension
PB1800

A Guide for Matching Oak Species
with Sites during Restoration
of Loess-influenced Bottomlands
in the West Gulf Coastal Plain

Mercker et al., 2006
<https://utia.tennessee.edu/publications/wpcontent/uploads/sites/269/2023/10/PB1800.pdf>

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Options for Managing Bottomland Hardwoods

(Hodges et al. 1999)

Challenge: disturbances to the forest allow increased sunlight and exposed soil. This allows light-seeded species to invade (willow, cottonwood, sycamore, birch, box elder)

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Critical to Oak Reproduction

(Clatterbuck and Meadows 1992)

The amount of pre-harvest advanced growth and its size is the most important reproduction factor for bottomland oaks.

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Decision Tool:

- if advanced seedlings are $> 4'$ tall and abundant = harvest
- if advanced seedlings are $< 4'$ tall, conduct midstory release first, then harvest
- if advanced seedlings are absent, then underplant along with a midstory release, then harvest or
- well-timed harvest to coincide with year of good acorn crop (disc in??).

(Hodges et.al. 1999)


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Timber Harvesting Occurs to:

1. Thin immature stands
2. Regenerate mature stands

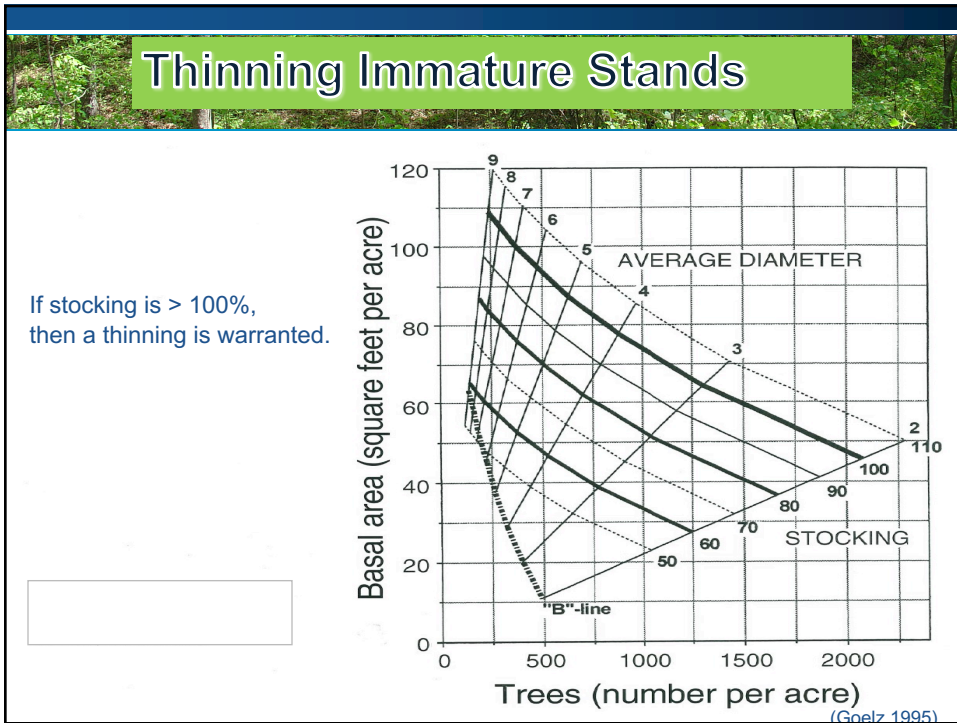
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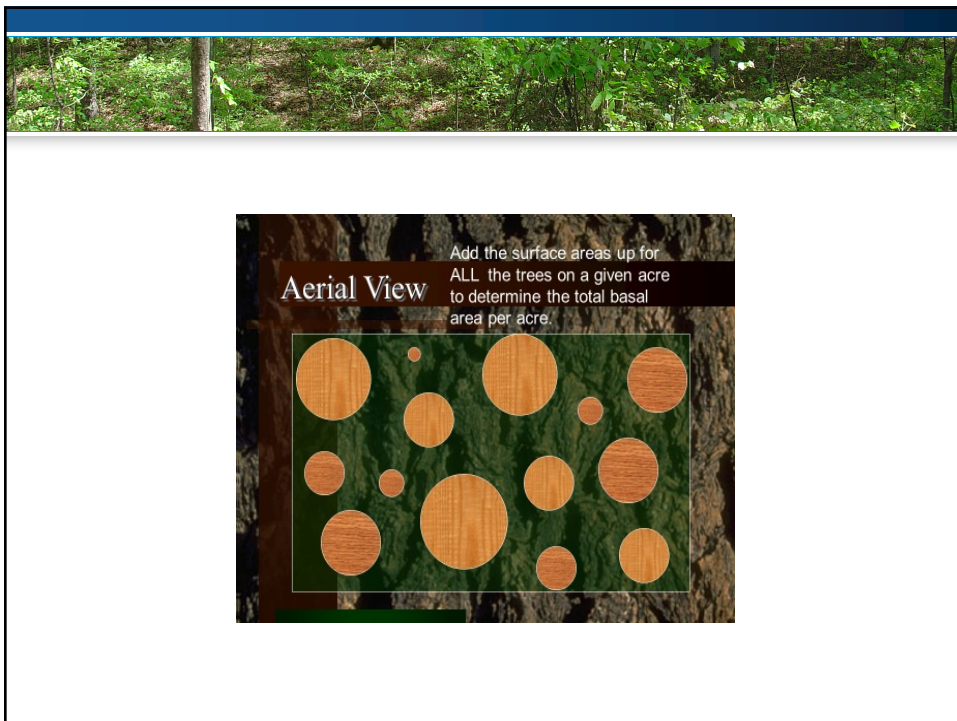
Thinning is Determined by Stocking

1. Overstocked
2. Fully Stocked
3. Understocked

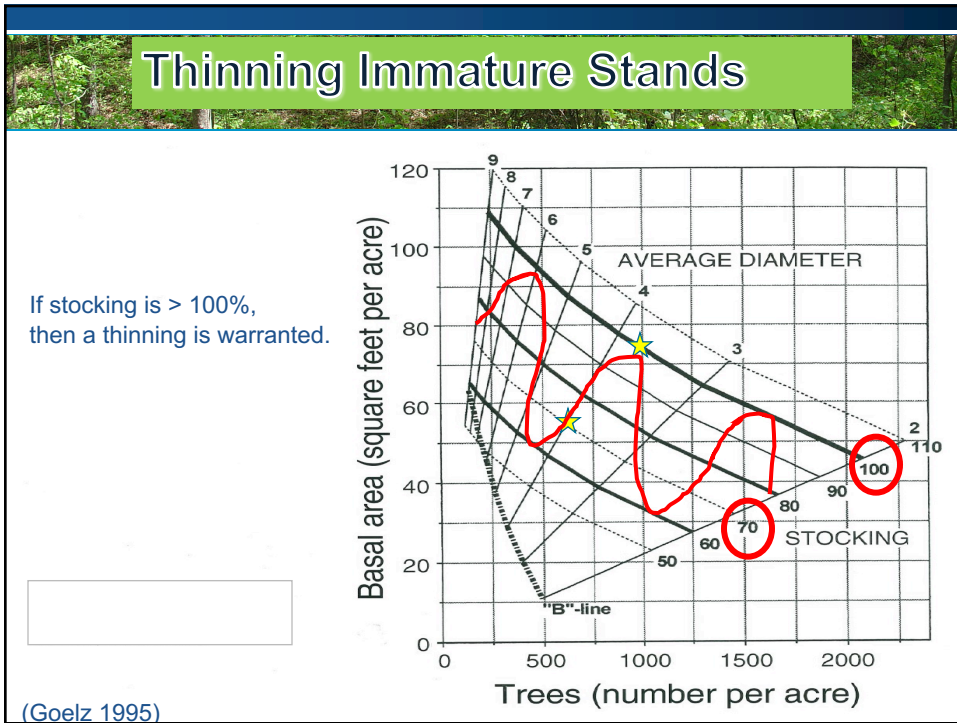
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Categories for Thinning Commercial Stands

1. Cutting stock
2. Preferred growing stock
3. Reserve growing stock
4. Cull stock

(Putnam et al., 1960)

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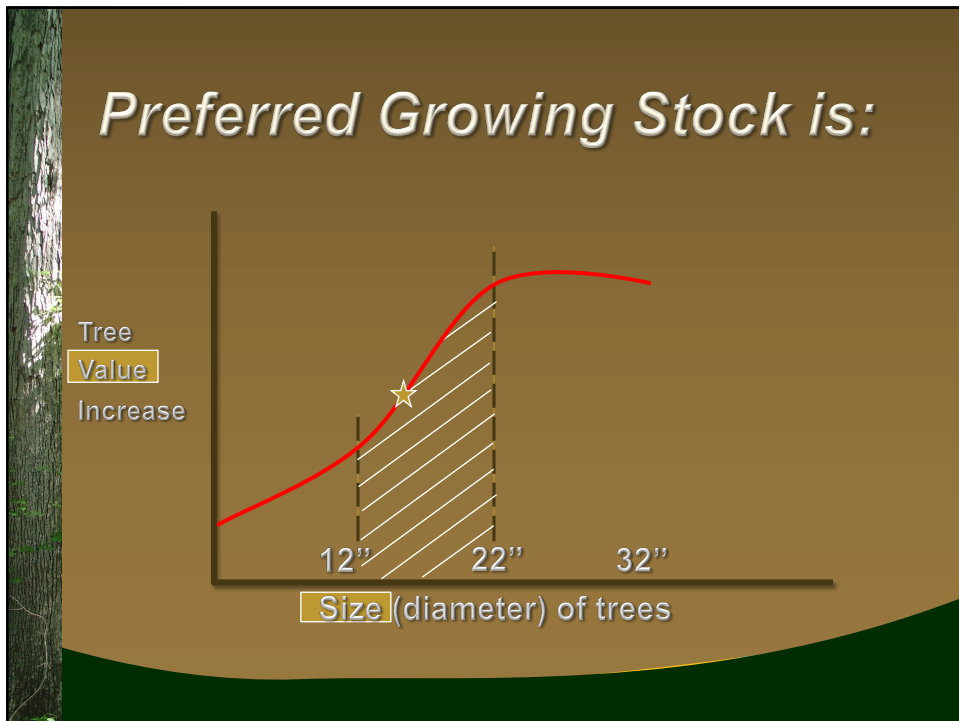
Cutting Stock

A photograph showing a forester in a forest, wearing a tan shirt, blue jeans, and a cap. The forester is standing next to a large tree trunk and using a diameter tape to measure its diameter. The forest is lush with green foliage.

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Which Trees Should be Selected for Harvest?

1. Harvest all cutting and (most) cull stock
2. Harvest very few preferred growing stock
3. Reserve growing stock may be harvested or left to grow (subject to the stocking)

(Clatterbuck 2007)

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Is it Cutting, Preferred, Reserve or Cull Stock?

1 – Cull stock



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Is it Cutting, Preferred, Reserve or Cull Stock?

2 - Preferred growing stock



A photograph of a tall, slender tree trunk in a forest. Two horizontal red lines are drawn across the trunk, one near the top and one lower down, indicating measurement points for the tree's height or diameter.

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Is it Cutting, Preferred, Reserve or Cull Stock?

3 - Cutting stock



A photograph of a man wearing a light-colored shirt and a wide-brimmed hat, standing next to a large tree trunk in a forest. He is leaning against the trunk, providing a scale for the tree's size.

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Is it Cutting, Preferred, Reserve or Cull Stock?

4 – Cutting
Oak is mature
Red maple is unacceptable

A photograph showing two tree trunks in a forest. The tree on the left is a red maple, and the tree on the right is a mature oak. Both trunks have a red horizontal line drawn around them, indicating they are to be cut.

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Is it Cutting, Preferred, Reserve or Cull Stock?


5 – Preferred GS and cutting stock
White oak = preferred
Red oak = cutting

A photograph of a forest scene with several tree trunks. A red horizontal line is drawn around the trunk of a tree on the right side of the image, indicating it is to be cut.

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Is it Cutting, Preferred, Reserve or Cull Stock?

6 – Cutting stock

A photograph of a tree trunk in a snowy forest. The tree has a thick, dark trunk and several large, spreading branches. The ground is covered in snow, and other trees are visible in the background. The image is framed by a white border.

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Is it Cutting, Preferred, Reserve or Cull Stock?


7 – Cutting stock

A photograph of a tree trunk in a snowy forest. The tree has a thick, light-colored trunk and several smaller branches. The ground is covered in snow, and other trees are visible in the background. The image is framed by a white border.

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Is it Cutting, Preferred, Reserve or Cull Stock?

8 – Cull stock



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Is it Cutting, Preferred, Reserve or Cull Stock?

9 – Preferred growing stock (14" dbh)



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Is it Cutting, Preferred, Reserve or Cull Stock?

10 – Reserve growing stock



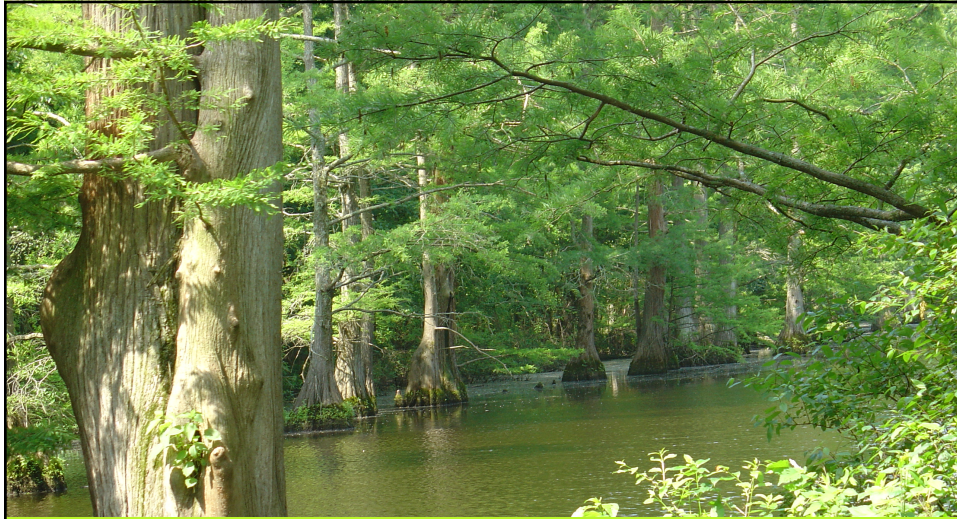
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Time lapse – 15 years

Preferred growing stock that became cutting stock



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Bottomland hardwoods are vital. They filter floodwater, provide essential habitat, store carbon, and produce high quality timber. Managing them is challenging. Landowners should seek professional help when working on or within these unique ecosystems.