

Silviculture
FORS 3347
 Instructor: Dr. Jeremy Stovall
 Lecture 18:
 Intermediate Treatments: Density Management I

How Does Thinning Affect a Stand?

- How many years until we thin?
 - What does this depend on?

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When To Thin

**Total Volume (Thinned + Standing)
6 years after thinning**

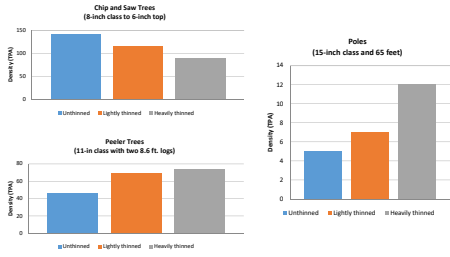
Treatment	Volume (M ³ /A)
Unthinned	~3300
Lightly thinned twice	~3200
Heavily thinned twice	~3000

**Total Volume (Thinned + Standing)
21 years after thinning**

Treatment	Volume (M ³ /A)
Unthinned	~5500
Lightly thinned twice	~6300
Heavily thinned twice	~6400

Data from VaTech Loblolly Pine Growth & Yield Coop Regionwide Thinning Trial Established in 8-25 Year Old Plantations
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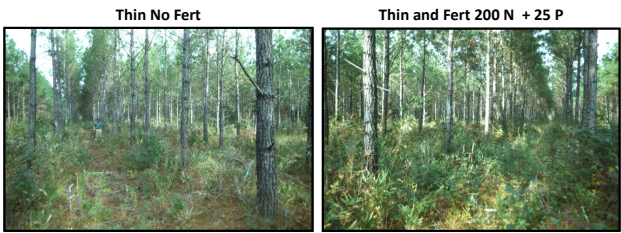
Effect of Thinning on Product Distributions



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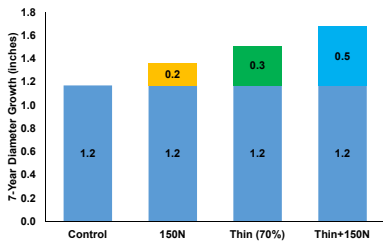
Thinning and Fertilization



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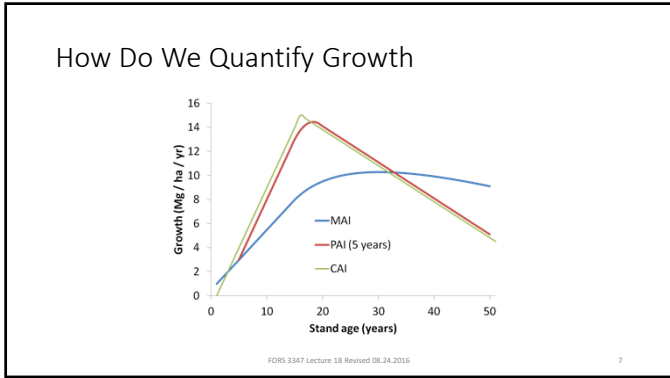
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Cumulative Treatment Effects



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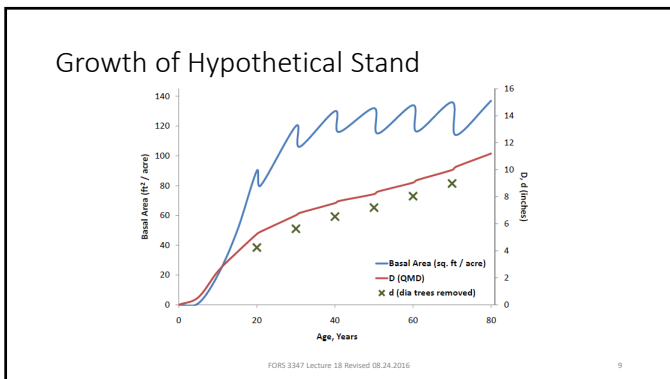
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d/D

- d: QMD of trees removed
- D: QMD of stand **before** thinning
- But after thinning if d/D is not 1, QMD changes

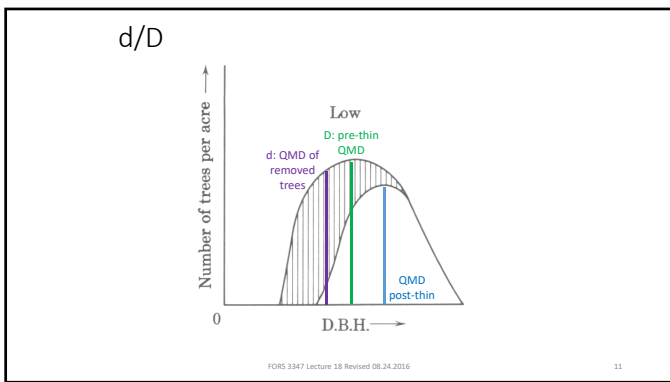
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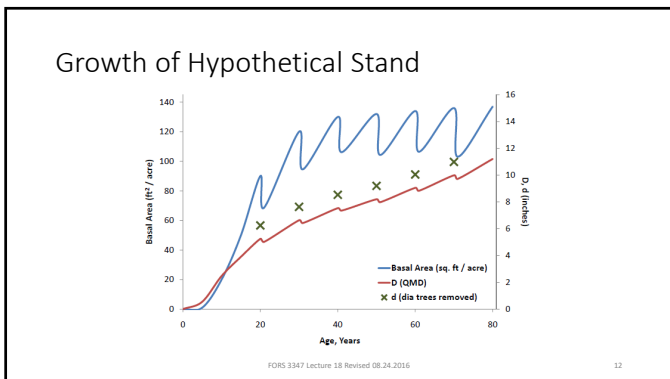


Effects of Thinning

- How does thinning affect QMD?

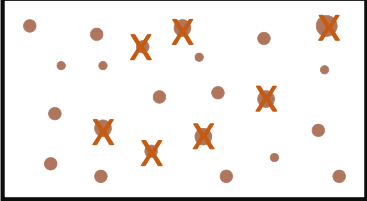
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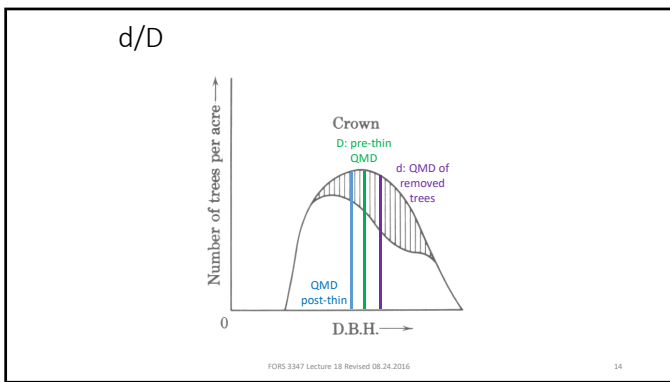


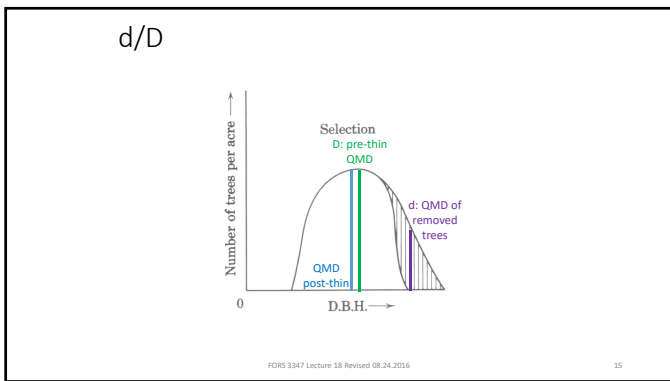
Effects of Thinning

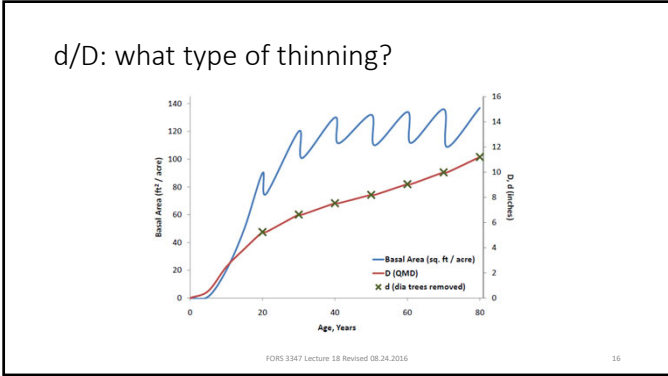
- How does thinning affect QMD?

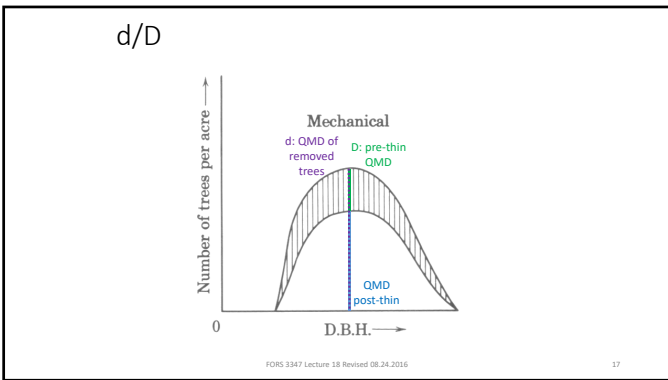


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- d/D
- d: QMD of trees removed
 - D: QMD of stand before thinning
 - Low < 1
 - Row = 1
 - Crown > 1, but not much more
 - Selection > 1
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QMD and Thinning

- D is QMD **before** thinning
- But after thinning if d/D is not 1, QMD changes
- For typical low thinnings, QMD after thinning will be 1.05 to 1.20
- We often use 1.09 for average Grade C thinning

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Group Exercise

- You have a naturally regenerated shortleaf pine stand.
 - BA = 145 ft²/ac
 - Density = 250 TPA
 - QMD = 10.3 in
- Free thinning target is 60 ft²/ac, mark trees based on landowner objective to develop dense understory for woodcock and wintering sparrow habitat.
- How do you decide which/how many trees to mark to meet your target?

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DX rule

- Constants
 - D = diameter of tree
 - X = constant we use (ranges 1 to 3)
 - X typically 1.75 to 2.00
- Application
 - Measure or estimate diameter of tree
 - Multiply by X
 - Mark all trees within X feet of target tree for removal in thinning (unless below min diam limit)

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If you know what BA you want...

BA	X
40	2.44
45	2.30
50	2.18
55	2.08
60	1.99
65	1.91
70	1.84
75	1.78
80	1.72
85	1.67
90	1.62
95	1.58
100	1.54
105	1.50
110	1.47
115	1.44
120	1.41
125	1.38
130	1.35

$$x = \sqrt{\frac{43,560 \times 0.005454}{BA}}$$

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D + X rule

- D = QMD **AFTER** thinning
- X = constant we use (ranges 1 to 8)
- X typically 6
- QMD of 10, average spacing = 16 feet
- Marking, account for DBH of leave tree
- 14 inch tree + 6 = 20 feet thinned around it

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D + "X" Rule

Rather than use the D+6 rule, it is preferable to develop a custom rule for each stand. To do this, you need an estimate of the expected QMD after thinning and the desired basal area per acre after thinning:

Example: If current BA/Acre = 135 sq ft and you want to remove 35% of the basal area in a low grade C thinning (0.65 will remain) and the QMD prior to thinning is 9.6; after thinning QMD estimated to be 10.5 inches (9.6" times 1.09).

Basal area of 10.5" tree = 0.6013 sq ft Desired after thin BA/A = (135).65 = 87.8 sq ft

(87.8 sq ft per acre / 0.6013 sq ft per tree) = 146 trees per acre

43560 sq ft per acre / 146 trees per acre = 298.4 sq ft of growing space per tree

SQRT(298.4) = 17.3 ft Since D = 10.5, then
 10.5 + X = 17.3;
 X = 6.8 = **7**

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