

# Management Practices to create DFCs in Bottomland Forests

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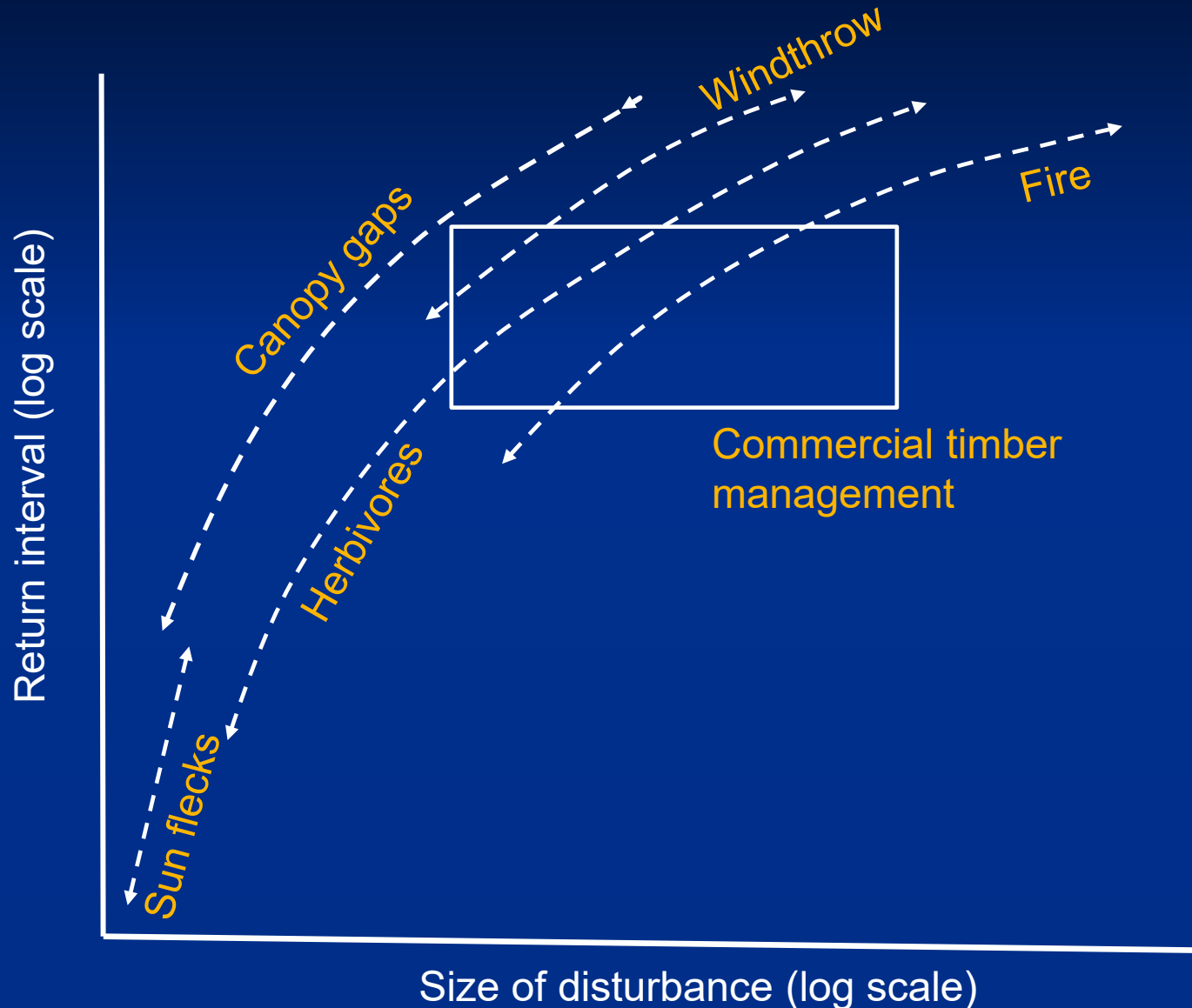
# Forest Management is a Disturbance



[https://commons.wikimedia.org/wiki/File:Coarse\\_woody\\_debris\\_6407.JPG](https://commons.wikimedia.org/wiki/File:Coarse_woody_debris_6407.JPG)

Disturbances influence structure and composition of a stand

# Natural disturbances and timber management



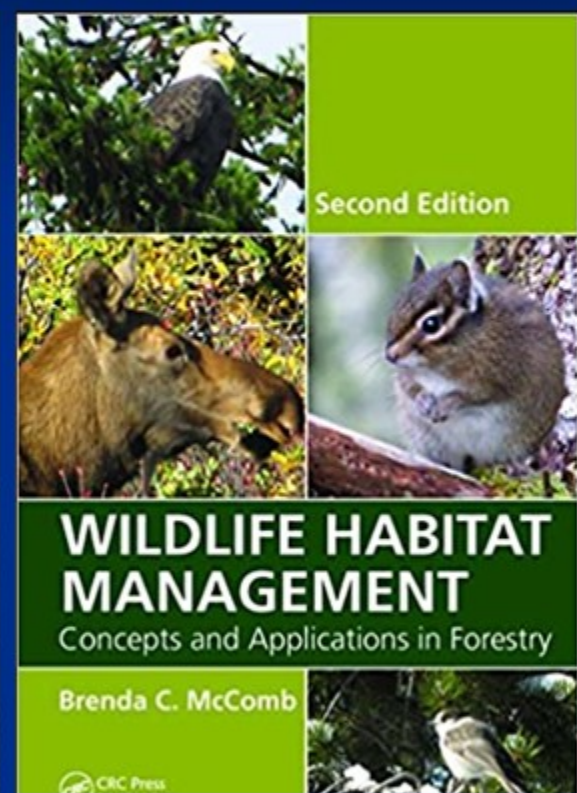
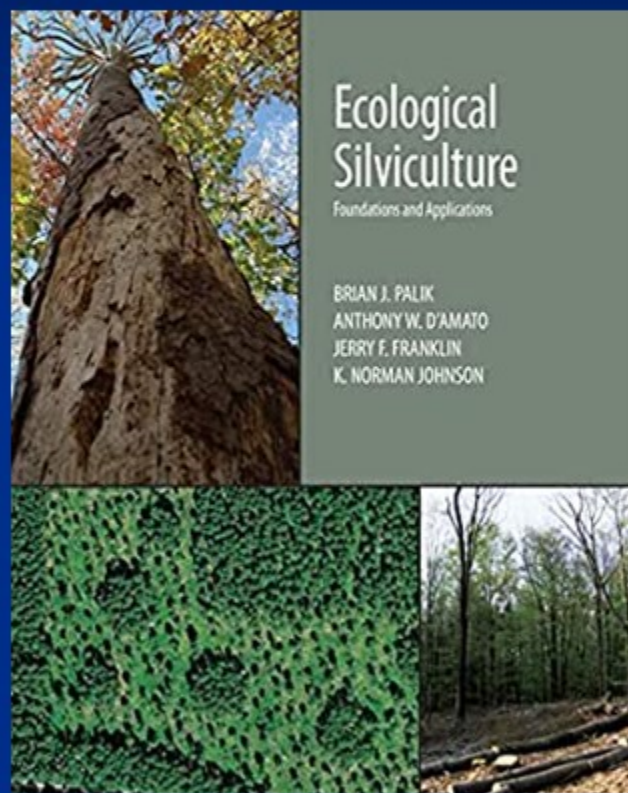
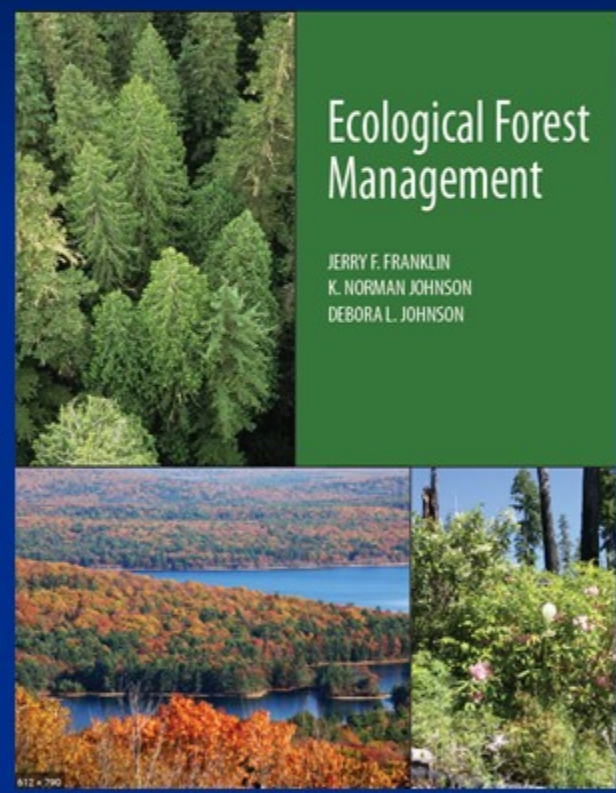
Disturbances occur over a wide range of sizes and return intervals, but commercial timber management typically occurs over a more constrained domain of space and time. Very small disturbances caused by logging are not economically feasible and very large disturbances caused by logging are not socially acceptable (adapted from M.L. Hunter, 1999).

# Conceptual Framework

Active management with a forest products focus

Active management with habitat or multiple products focus →

Passive management to allow natural disturbances to achieve goals



# Major Approaches to Forest Management

## Production Forestry

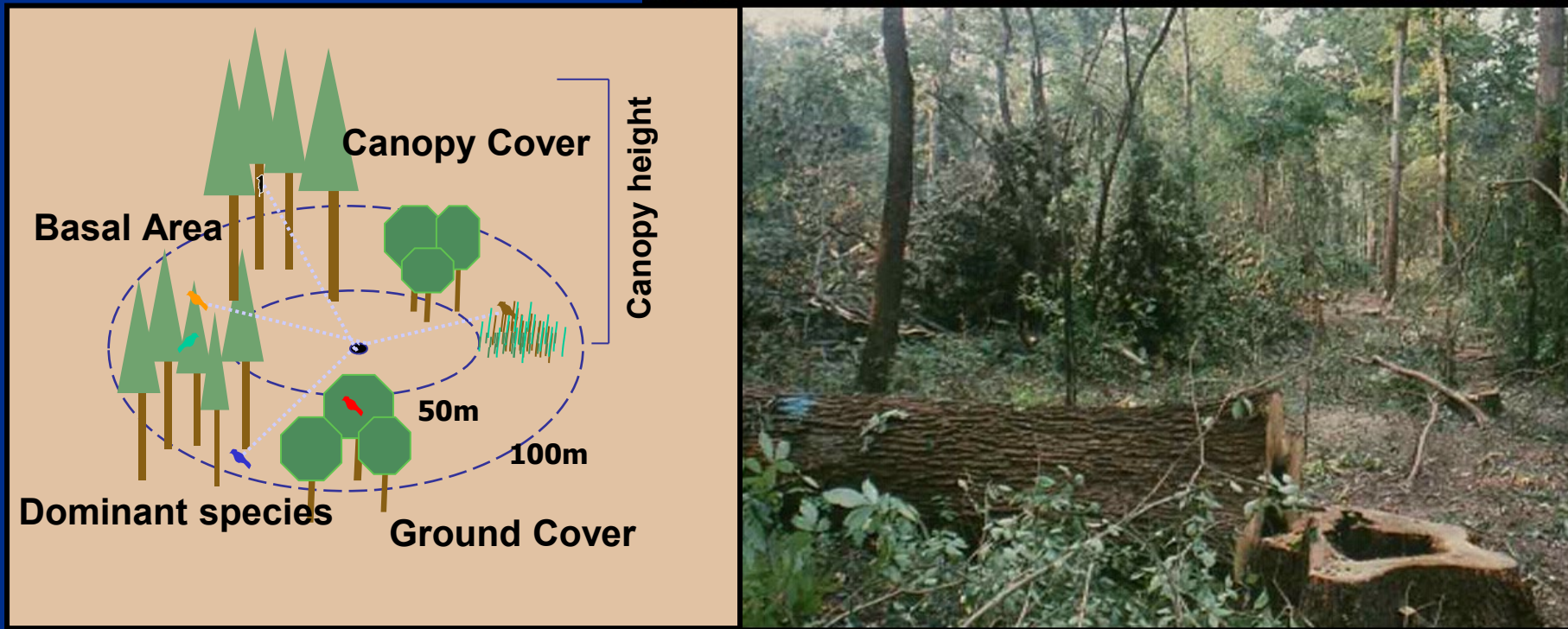
- Based on Agronomic Model
  - Spacing, weeding, fertilizing, etc.
- Maximizes single or few resources
  - \$ - High rate of return
- Simple/homogeneous structure & composition
- Focus on growth and reducing risks of crop

## Ecological Forestry

- Based on Natural Stand Development Model
  - Disturbances are basis for Rx
- Maintains ecosystem structure and function but does not maximize singular resources
- Reduced ROI
- Promotes complexity & heterogeneity

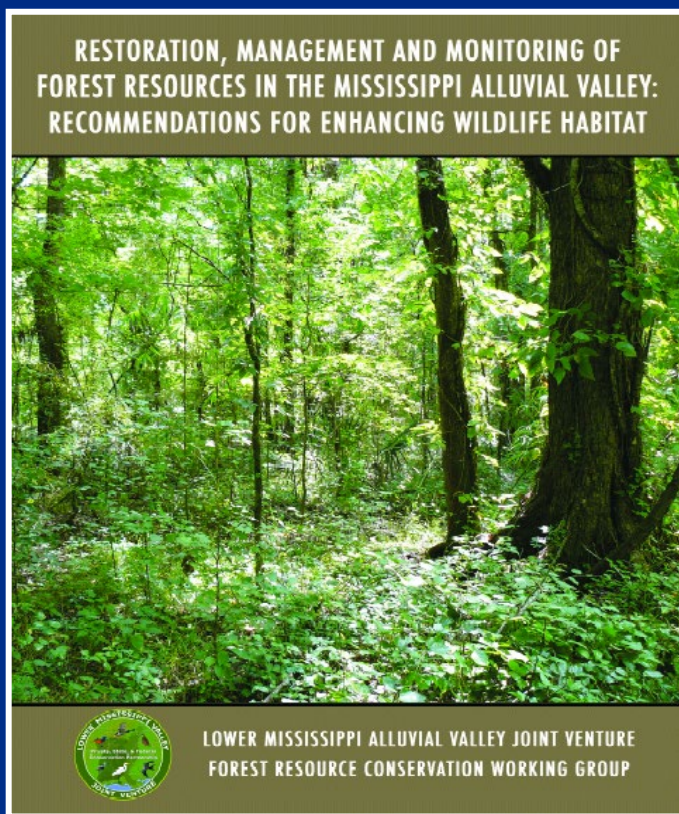
# Desired Forest Conditions to Enhance Wildlife Habitat

- Why do we need to define Desired Forest Conditions?
  - Explicit linkage between wildlife needs and structural forest attributes
  - Provides basis for research and monitoring (i.e., Adaptive Management)

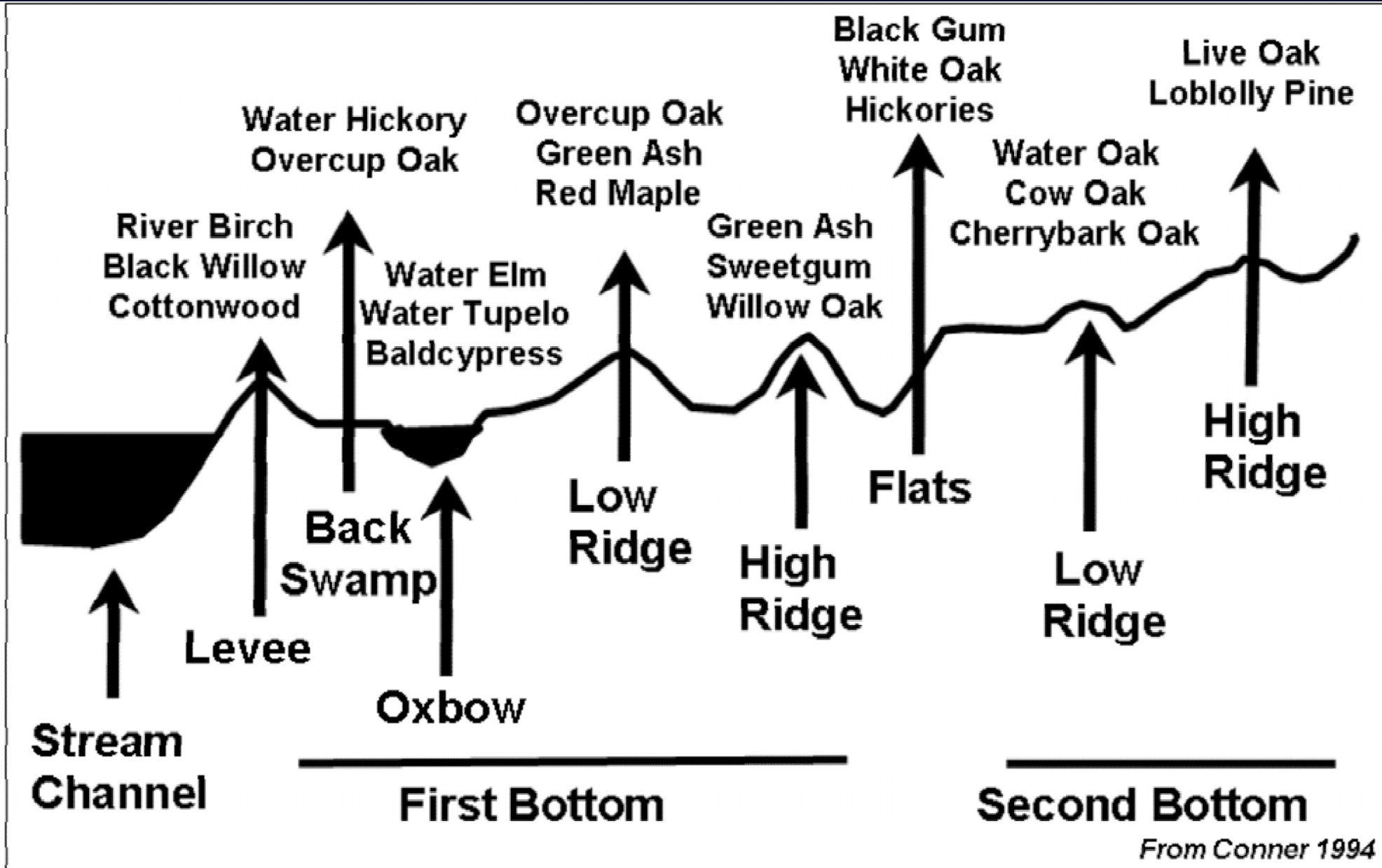




# Lower Mississippi Valley Joint Venture's Forest Resource Conservation Working Group, 2007



Forest Variables <sup>1</sup>	Desired Stand Structure	Conditions That May Warrant Management
<b>Primary Management Factors</b>		
Overstory Canopy Cover	60-70%	> 80%
Midstory Cover	25-40%	< 20% or > 50%
Basal Area	60-70 ft <sup>2</sup> /acre with ≥ 25% in older age classes <sup>2</sup>	> 90 ft <sup>2</sup> /acre or ≥ 60% in older age classes
Tree Stocking	60-70%	< 50% or > 90%
<b>Secondary Management Factors</b>		
Dominant Trees <sup>3</sup>	> 2/acre	< 1/acre
Understory Cover	25-40%	< 20%
Regeneration <sup>4</sup>	30-40% of area	< 20% of area
Coarse Woody Debris (>10 inch diameter)	≥ 200 ft <sup>3</sup> /acre	< 100 ft <sup>3</sup> /acre
Small Cavities (<10 inch diameter)	> 4 visible holes/acre or > 4 "snag" stems ≥ 4 inch dbh or ≥ 2 stems > 20 inch dbh	< 2 visible holes/acre or < 2 snags ≥ 4 inch dbh or < 1 stem ≥ 20 inch dbh



*From Conner 1994*

# Silvics

- USFS Guide to Bottomland Hardwood
  - [https://www.srs.fs.usda.gov/pubs/gtr/gtr\\_srs040.pdf](https://www.srs.fs.usda.gov/pubs/gtr/gtr_srs040.pdf)
- Table 4.1
  - Species
  - Habitat
  - Tolerance to shade & flooding
  - Seed Ripening Dates & seeding suitability
  - Food value for waterfowl/deer/turkey/migratory birds
  - Wood product suitability

- Silvics of North America

- [https://www.srs.fs.usda.gov/pubs/misc/ag\\_654/table\\_of\\_contents.htm](https://www.srs.fs.usda.gov/pubs/misc/ag_654/table_of_contents.htm)

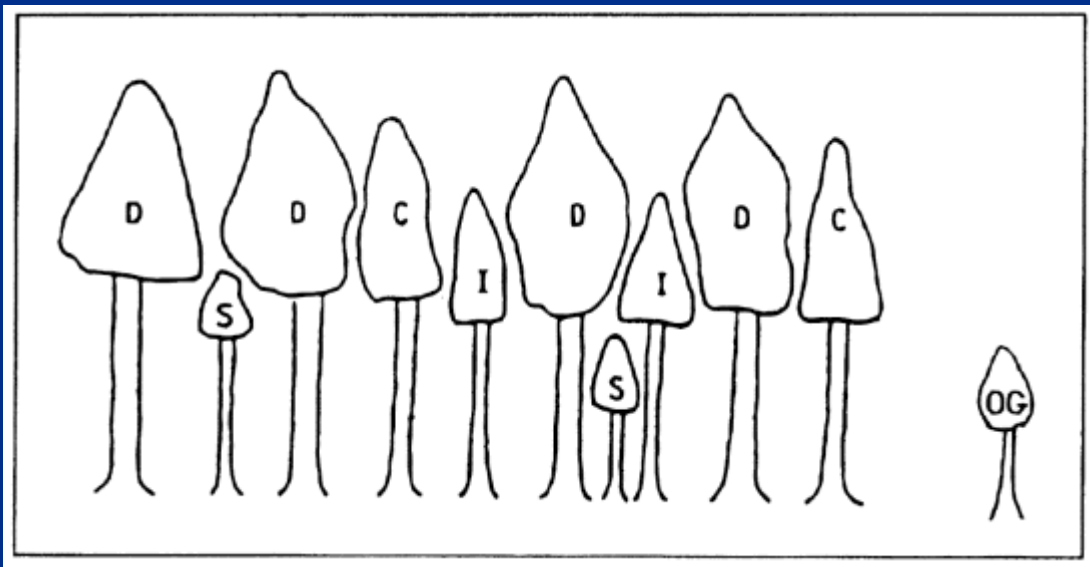


# Types of silvicultural systems

- **Even-aged (Single Cohort)**
- **Uneven-aged (Multiple Cohort)**
- **Ecological Silviculture could be either or both and is guided by Disturbance Ecology**

A **cohort** is a group of trees arising from a single disturbance.

The term “**even-aged**” is used loosely, since regeneration after a disturbance may take several years.



## Crown classes in an even-aged stand

D=dominant

C=codominant

I=intermediate

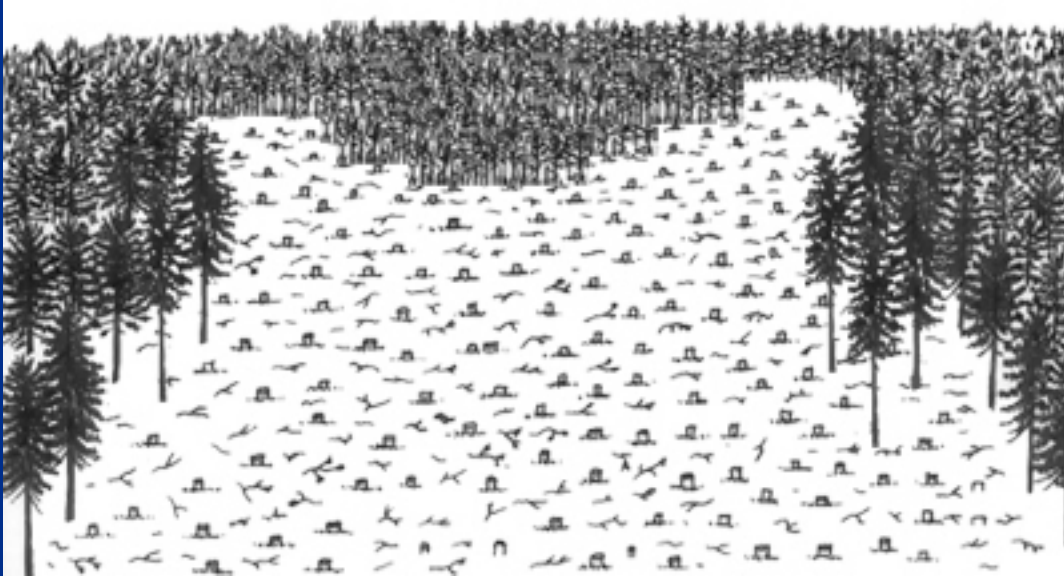
S=suppressed

OG= open-grown

<https://www.fs.fed.us/psw/publications/documents/gtr-155/06-duriscoe.html>

# Even-Aged Regeneration methods: Clearcut

Removing all trees from a site, either to release existing regeneration, or to provide a planting site.



<https://www.nrs.fs.fed.us/fmg/nfmq/fm101/silv/index.htm>



[https://commons.wikimedia.org/wiki/File:Northern\\_Oregon\\_Coast\\_Range\\_clearcuts - Washington and Yamhill counties, Oregon.jpg](https://commons.wikimedia.org/wiki/File:Northern_Oregon_Coast_Range_clearcuts_-_Washington_and_Yamhill_counties,_Oregon.jpg)

# Even-Aged Regeneration methods: Seed Tree

Removing most trees from a site, except trees that provide seeds to establish the next stand.



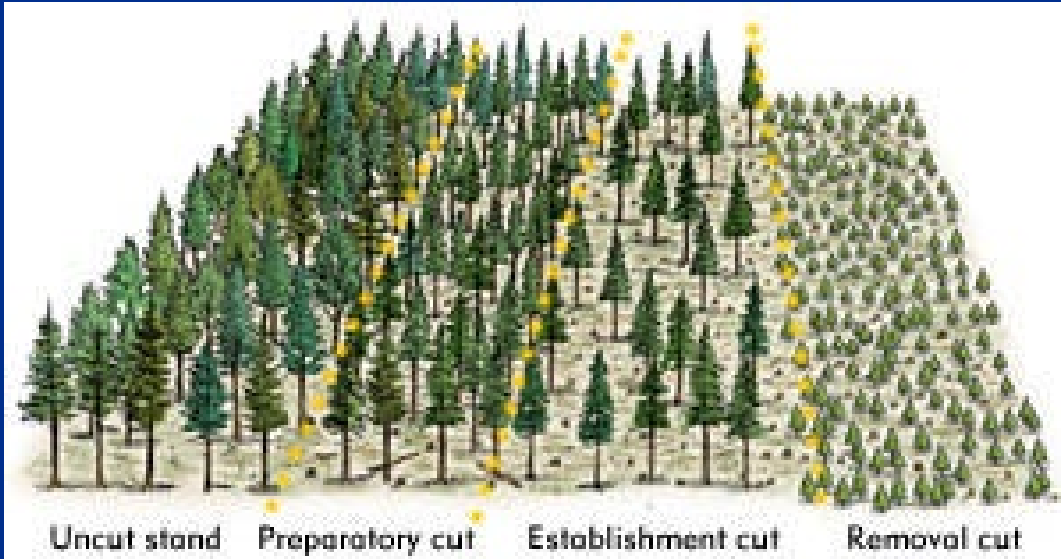
The “seed trees” are usually removed once the new stand is established.



<https://www.nrs.fs.fed.us/fmg/nfmg/fm101/silv/index.htm>

[https://commons.wikimedia.org/wiki/File:Pinus\\_echinata\\_thinned\\_forest\\_2.jpg](https://commons.wikimedia.org/wiki/File:Pinus_echinata_thinned_forest_2.jpg)

# Even-Aged Regeneration methods: Shelterwood



- **Prep cut:** release the crowns to produce more seeds
- **Establishment cut** increase light to the forest floor (necessary?)
- **Overstory removal:** release the regeneration



# Even-Aged Regeneration methods: Continuum of Conditions

Clearcut

Seed Tree

Shelterwood



LESS

MORE

vertical structure

shade

moisture

animal-dispersed seeds

# Uneven-Aged Regeneration Methods: Individual Tree Selection

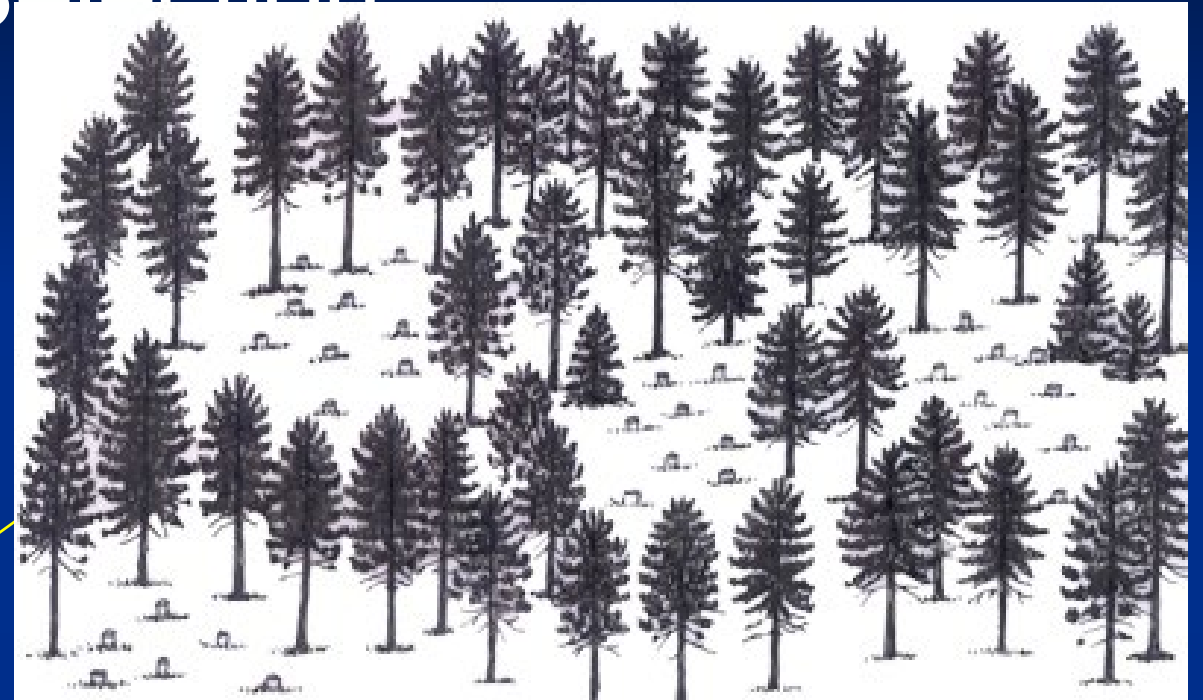
Removing scattered trees of **all size classes** to create growing space for remaining trees.



<https://www.nrs.fs.fed.us/fmg/nfmg/fm101/silv/index.htm>

# Uneven-Aged Regeneration Methods: Group Selection

Removing trees in groups in which the width of the gap created is typically less than the height of the trees.



<https://www.nrs.fs.fed.us/fmg/nfmg/fm101/silv/index.htm>

# Variable Retention Harvest



# Variable Retention Harvest

- Regeneration Harvest
  - Mimics Normal Range of Variation
    - No treatment to heavy treatment
  - Regenerate shade intolerant and tolerant species
- Combines Different Harvesting Methods
  - Small clearcuts or patchcuts
  - Seed tree
  - Shelterwood
  - Expanding gaps (femelschlag)
  - Group selection
  - Single tree selection

# Stand Re-establishment

- **Methods:**
  - Natural regeneration (free but some states require regeneration with a certain time frame)
  - Plant seedlings (\$\$\$)
- **Allows you to influence:**
  - Species composition
  - Diameter, density, and form of trees:

Low density regeneration →  
branchy, large diameter trees quickly

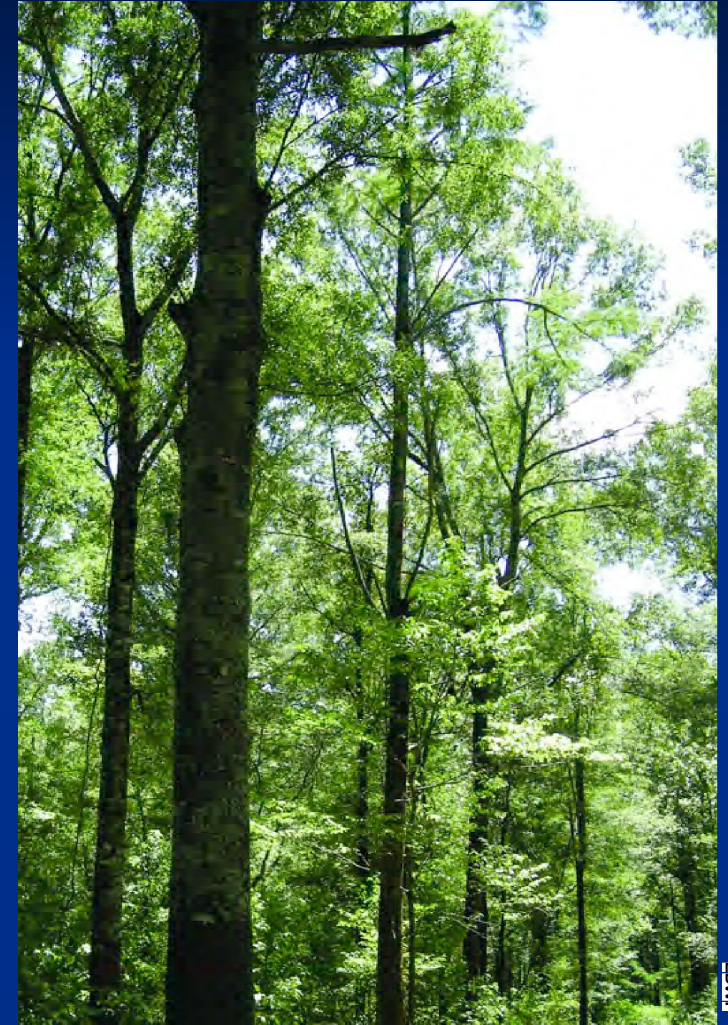
High density regeneration → many small  
diameter trees with few branches



[https://commons.wikimedia.org/wiki/File:A\\_group\\_of\\_tree\\_planters\\_\(5687794322\).jpg](https://commons.wikimedia.org/wiki/File:A_group_of_tree_planters_(5687794322).jpg)

# Thinning

- Two types of thinning:
  - Precommercial – trees too small to sell
  - Commercial – generates income
- Purpose:
  - Decrease stand density and competition
  - Increase diameter growth rate
  - Allow expansion of crowns and roots
  - Decrease tree mortality





SMSST



Randy Wilson



Jos M. S. S. S.

# Stepping Management Down

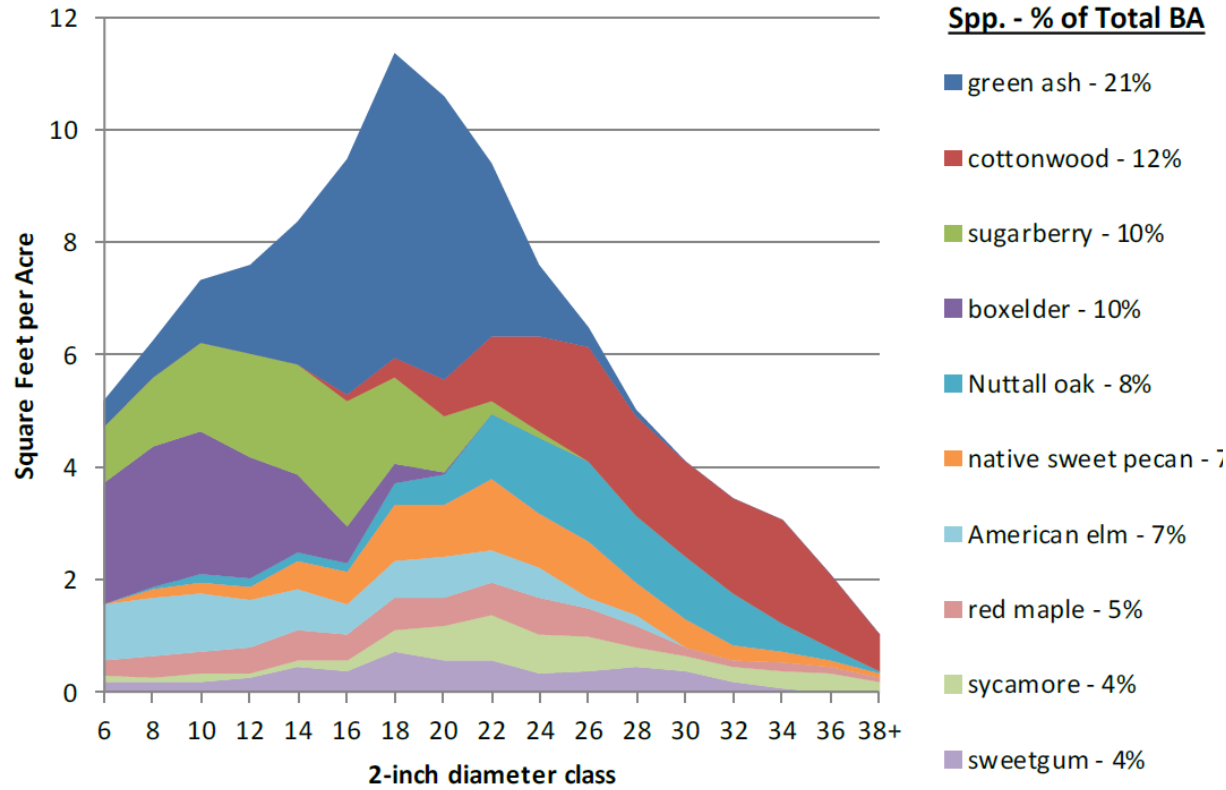
Forest Variables	Desired Stand Structure	Stand 09-05-A	Rating
<b>Primary Management Factors</b>			
Overstory Canopy Cover	60-70%	80%	HIGH
Midstory Cover	25-40%	54%	HIGH
Basal Area	±10% of B-line: 77 - 94	142	VERY HIGH
	≥ 25% older age class	17%	LOW
Tree Stocking	±10% of B-line: 60% - 80%	117%	VERY HIGH
<b>Secondary Management Factors</b>			
Dominant Trees	>2/Ac	0.1	LOW
Understory Cover	25-40%	54%	HIGH
Regeneration	30-40% of area	39%	-
Coarse Woody Debris	≥ 200 ft <sup>3</sup> /Ac		LOW
Small Cavities	> 4 snag stems ≥ 4 in DBH/Ac	3.4	LOW
	≥ 2 stems > 20 in DBH/Ac	24.6	-
Large Cavities	≥ 2 stems ≥ 26 in DBH/Ac	6.0	-
	≥ 8 ft <sup>2</sup> BA ≥ 26 in DBH/Ac	24.8	-
Standing Dead/Stressed	> 6 stems/Ac ≥ 10 in DBH	41.8	-
<b>Other Management Factors</b>			
Quadratic Mean Diameter (DBH in.)		14.8	
Doyle (Bdft/Ac)		10,685	
Pulpwood Volume (Tons/Ac)		23	
Standing Dead Volume (ft <sup>3</sup> /Ac)		64	
Cull Volume (ft <sup>3</sup> /Ac)		170	
Shade Intolerant/Tolerant (Percent of BA)		84% / 16%	

# Rx Cache River Stand 13-06-A

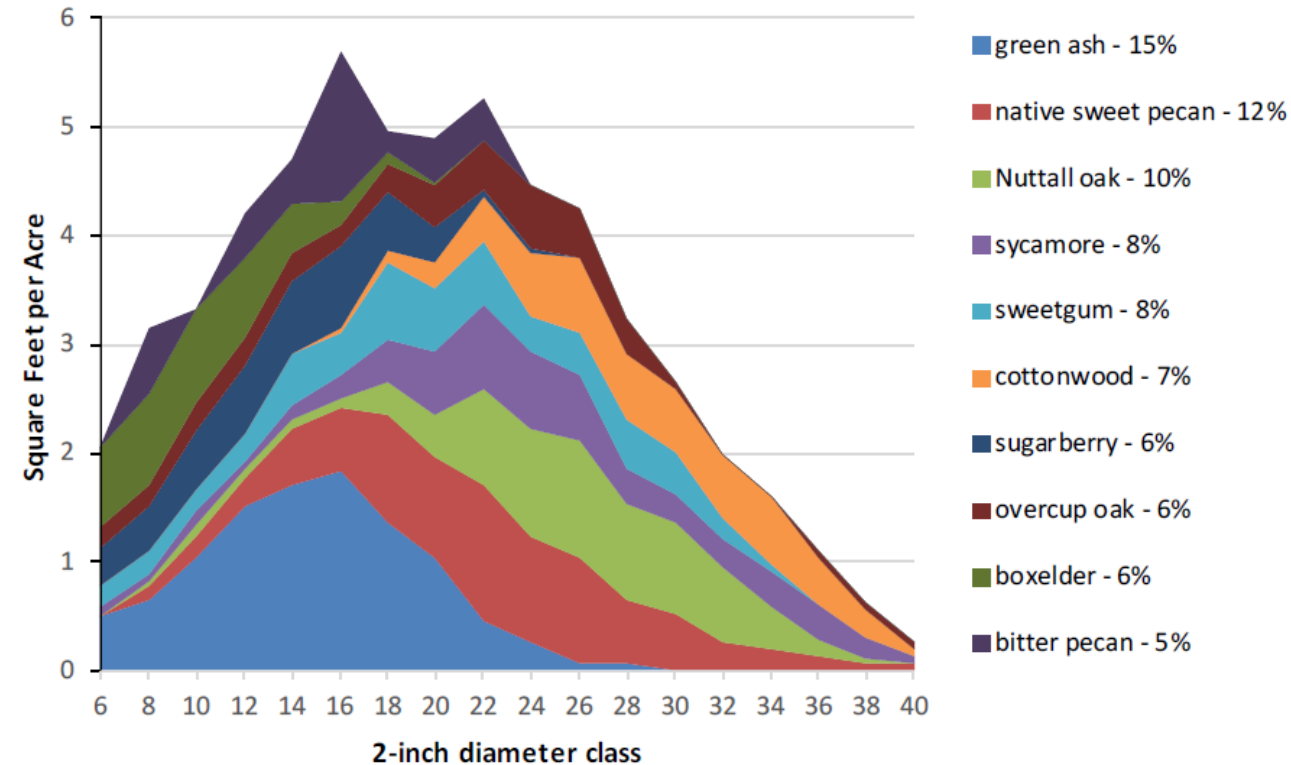
## Objectives

- Promote DFC's for wildlife
- Forest Health – EAB is emerging issue
- Increase Shade Intolerant Regeneration

### Stand 13-06-A BA Distribution of Top 10 Species



### Post Treatment BA Distribution Top 10 Species

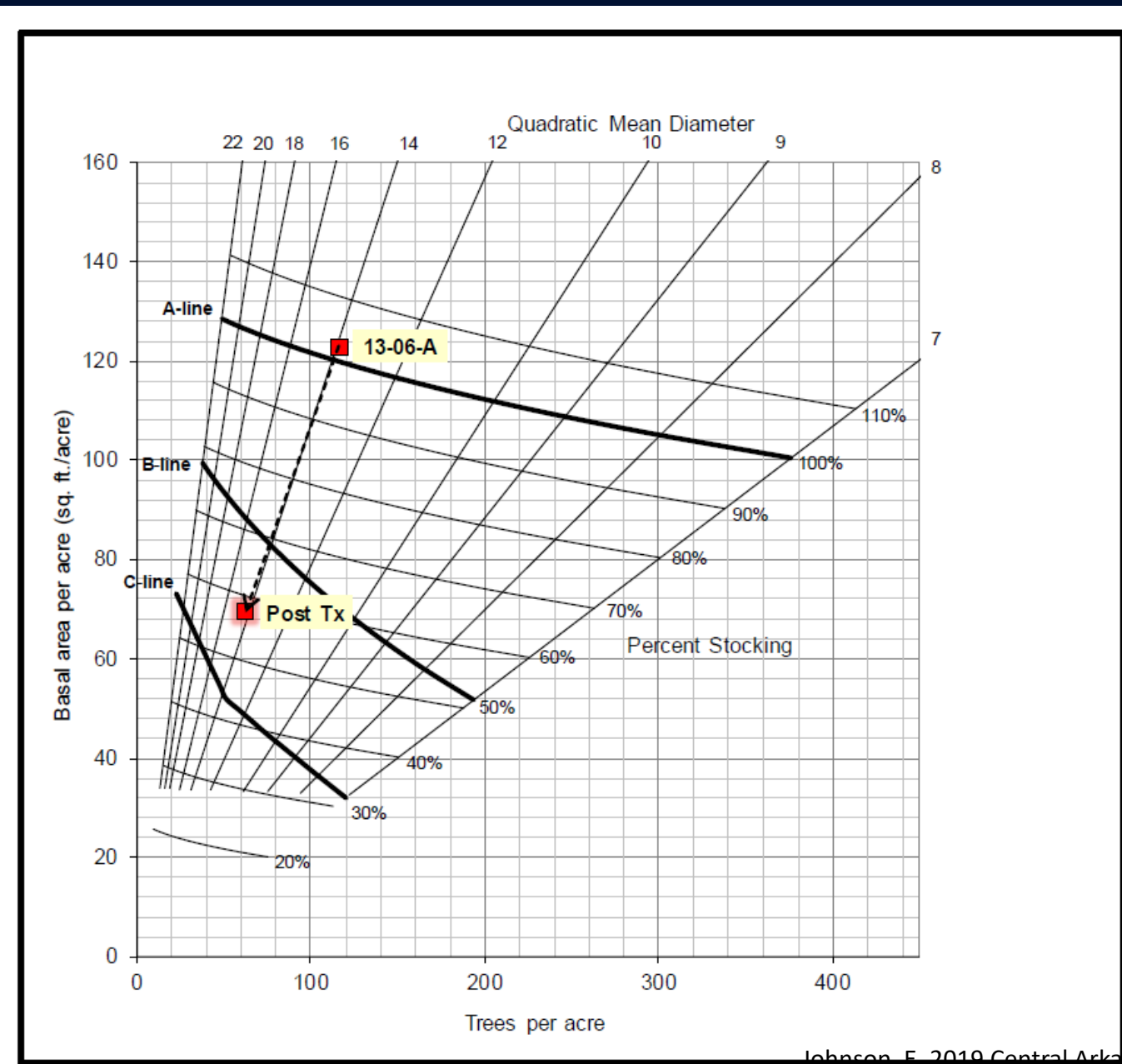


# Rx Cache River NWR

## Stand 13-06-A

Species Selection Guidelines

COMMON NAME	CURRENT BA	% BA TO CUT	BA (ft <sup>2</sup> /Ac.)	TARGET RESIDUAL
green ash	25.7	ST	15.3	10.4
cottonwood	15.3	66%	10.1	5.2
sugarberry	12.5	66%	8.3	4.3
boxelder	11.8	66%	7.8	4.0
Nuttall oak	9.4	25%	2.4	7.1
native sweet pecan	8.6		0.0	8.6
American elm	8.0	66%	5.3	2.7
red maple	6.5	66%	4.3	2.2
sycamore	5.5		0.0	5.5
sweetgum	5.5		0.0	5.5
overcup oak	4.1		0.0	4.1
bitter pecan	3.7		0.0	3.7
baldcypress	2.2		0.0	2.2
persimmon	1.4		0.0	1.4
shagbark hickory	0.6		0.0	0.6
cedar elm	0.4		0.0	0.4
honey locust	0.4		0.0	0.4
redbud	0.4		0.0	0.4
water oak	0.4		0.0	0.4
swamp chestnut oak	0.4		0.0	0.4
<b>TOTAL</b>	<b>122.7</b>	<b>43%</b>	<b>53.4</b>	<b>69.4</b>





● Small Cavities

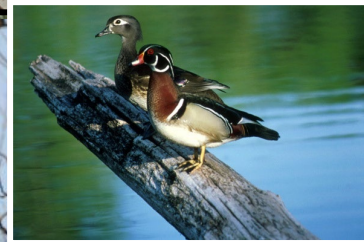


Spanish Moss



● Tall, Emergent Trees

2006



● Snags-large cavities



● Den trees



● Coarse down-woody Material