

# Inventory Approaches to Forest Baselines: MAV Bottomland Hardwoods Case Study



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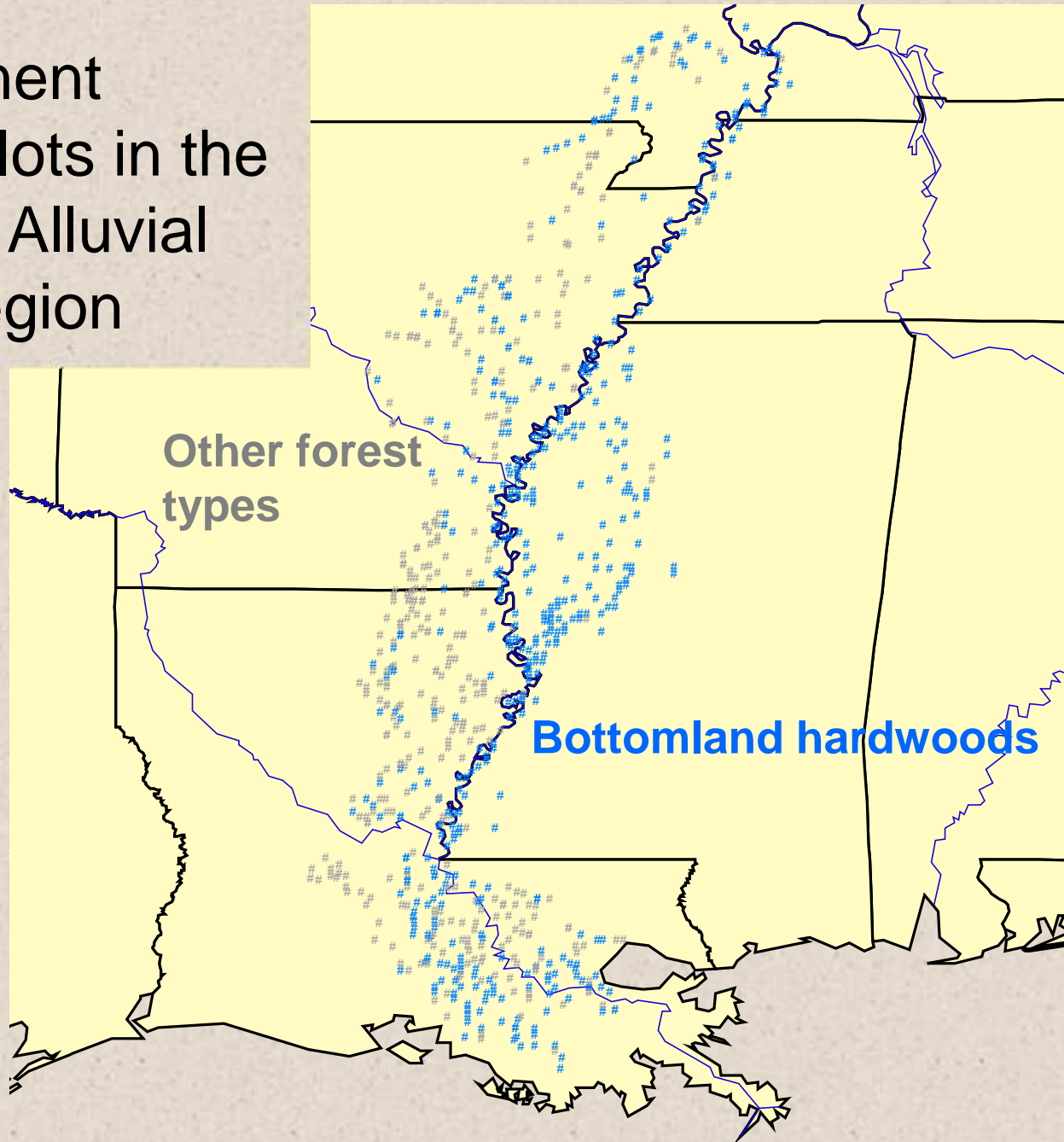


**Forestry and Agriculture Greenhouse Gas Modeling Forum**  
**October 12-15, 2004**  
**Shepherdstown, WV**

## Topics

- Inventory of MAV bottomland hardwood forests
- Carbon estimates from inventory – FORCARB
- 1605b default tables for forestry – average carbon growth and yield
- Uncertainty related to site-to-site heterogeneity
- Case study: Bottomland hardwood estimates for afforestation scenarios

FIA permanent  
inventory plots in the  
Mississippi Alluvial  
Plain ecoregion



# MAV Bottomland Hardwoods: Current area and carbon stocks summarized from FIADB and FORCARB

State	Survey year	All forest	Bottomland hardwoods	Planted bottomland hardwoods	Carbon in bottomland hardwoods
		-----	1000 acres	-----	Mt
Arkansas	2002	2,262	931	20	67.2
Illinois	2002	8	8	0	0.5
Kentucky	2002	50	41	2	3.6
Louisiana	2003	3,352	1,425	12	87.6
Mississippi	1994	1,094	1,062	19	65.4
Missouri	2001	155	111	2	8.8
Tennessee	1997	122	119	0	7.0
		7,043	3,697	56	240.1

# Change in bottomland hardwoods between two successive surveys

State/ Survey Year	Natural Regeneration	Planted
1000 acres		
Arkansas		
1995	1,850	17
2002	911	20
Louisiana		
1991	2,891	34
2003	1,413	12

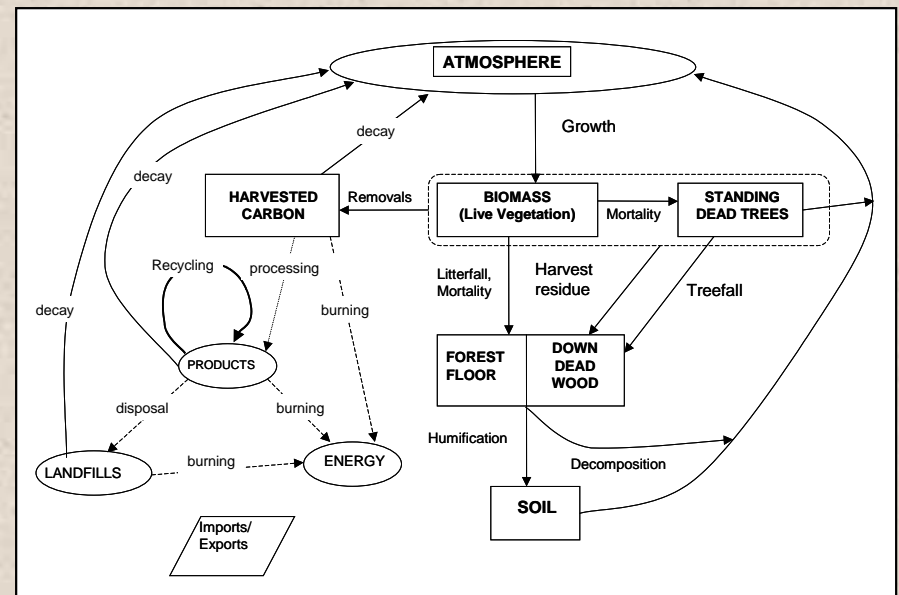
# FORCARB: Regional and National Estimates of Carbon in Forest Ecosystems and in Harvested Wood

Based on:

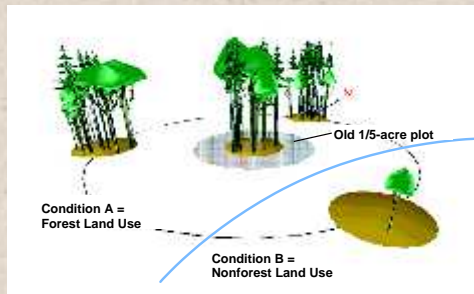
Inventory data, forest growth models, or state-level aggregate data

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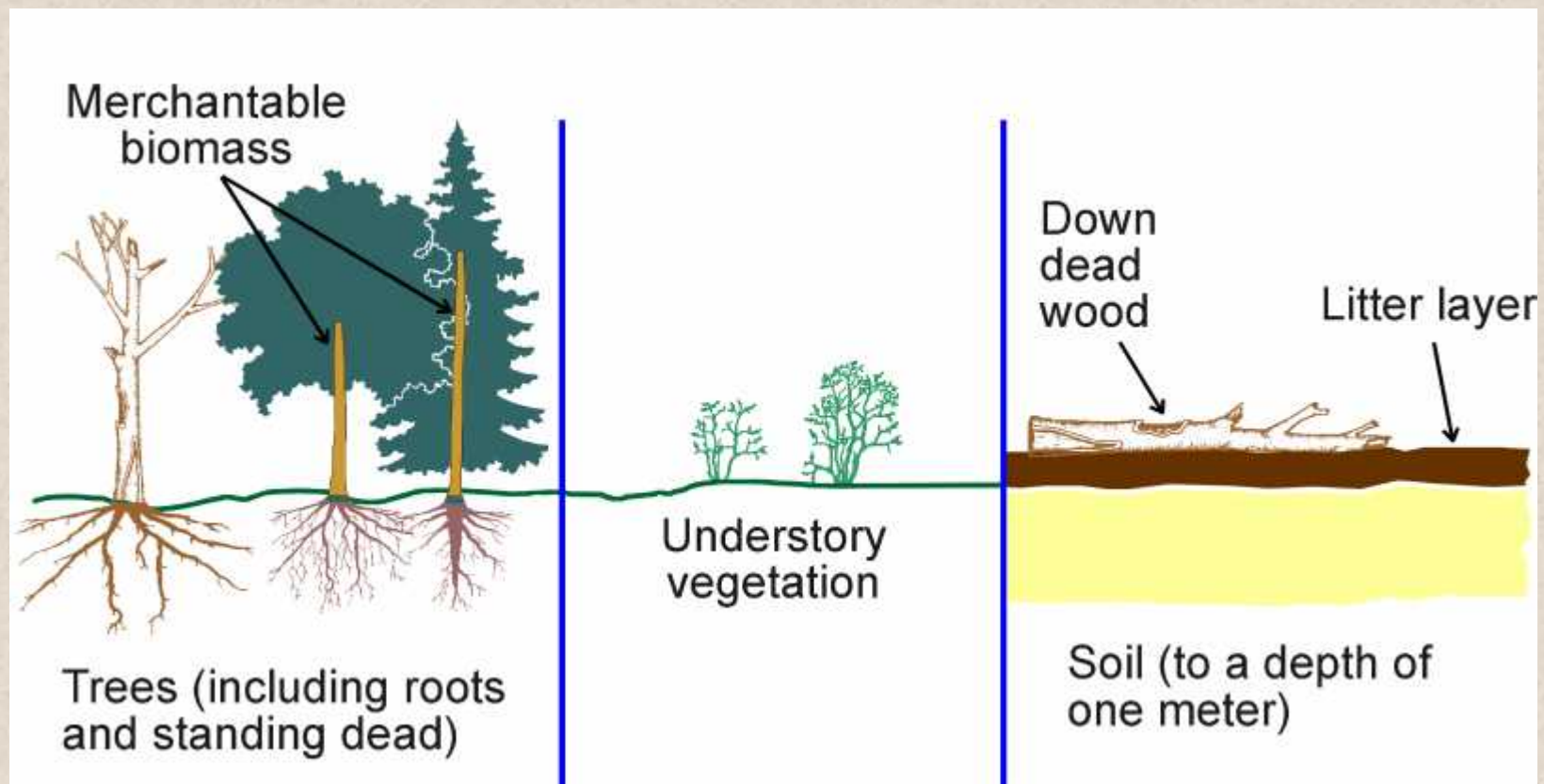
Process or empirical models to simulate specific carbon pools or transfer between pools



# Inventory data from FIA Phase 2 permanent plots

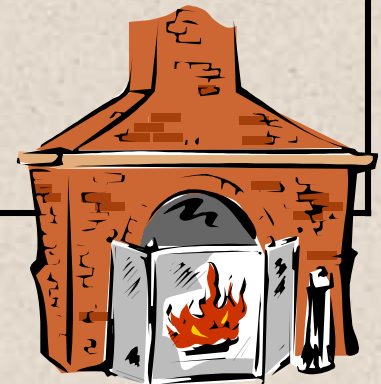
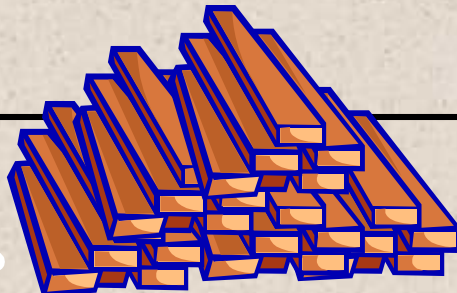


Carbon estimates are based on tree species and dimensions, forest type, volume of growing stock, and stand age.



# FORCARB also estimates components of carbon in harvested wood

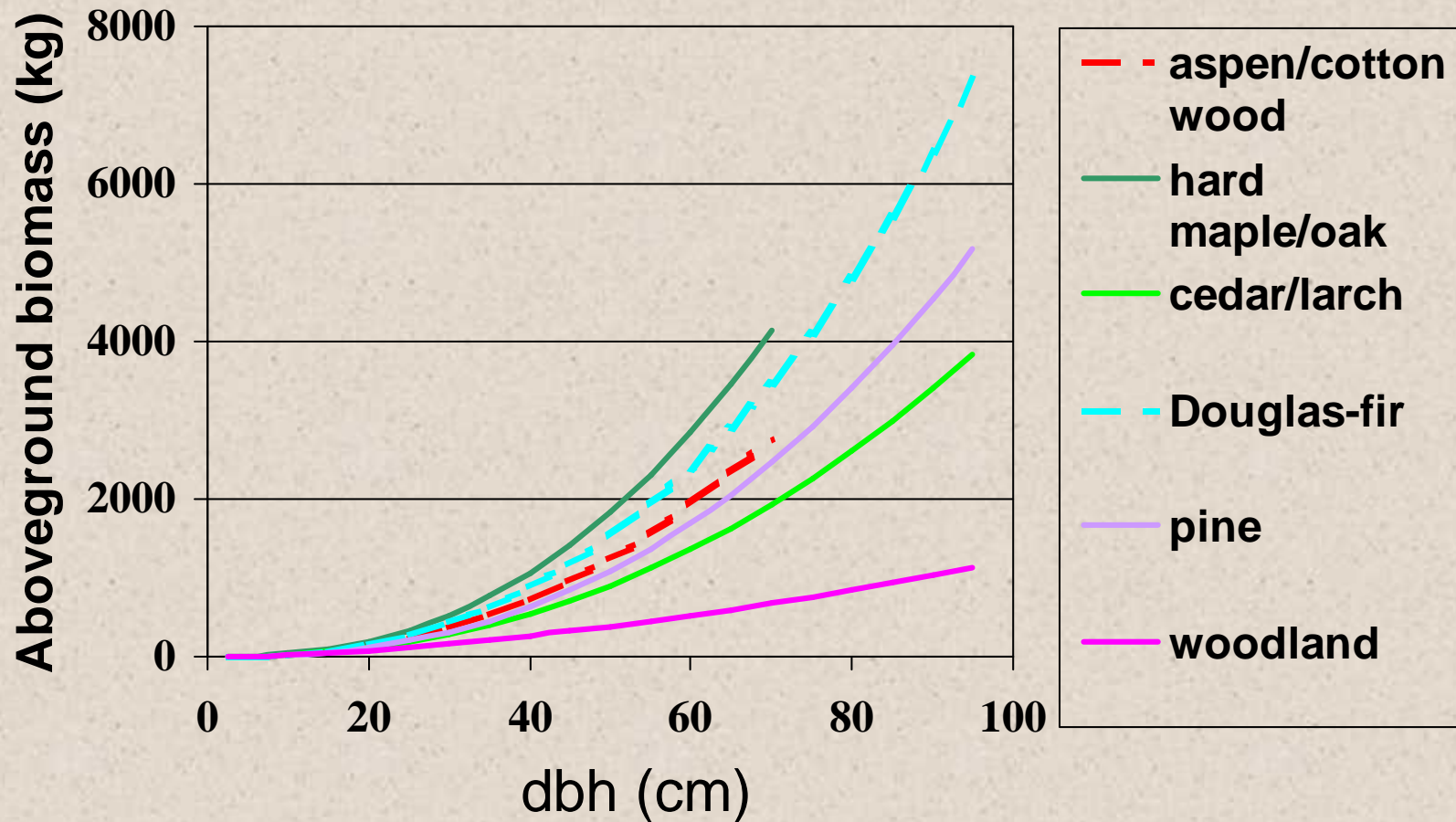
<b><u>PRODUCTS IN USE</u></b>	<b><u>LANDFILLS</u></b>	<b><u>EMISSIONS</u></b>	<b><u>BURNED FOR ENERGY</u></b>
Lumber Plywood Other panels Solid wood Paper Recycled Paper	Landfill wood Landfill paper	Waste wood, decayed or burned with no energy captured Decay of products & landfills	Products sent to landfills, recycling, emissions





# Biomass from tree data:

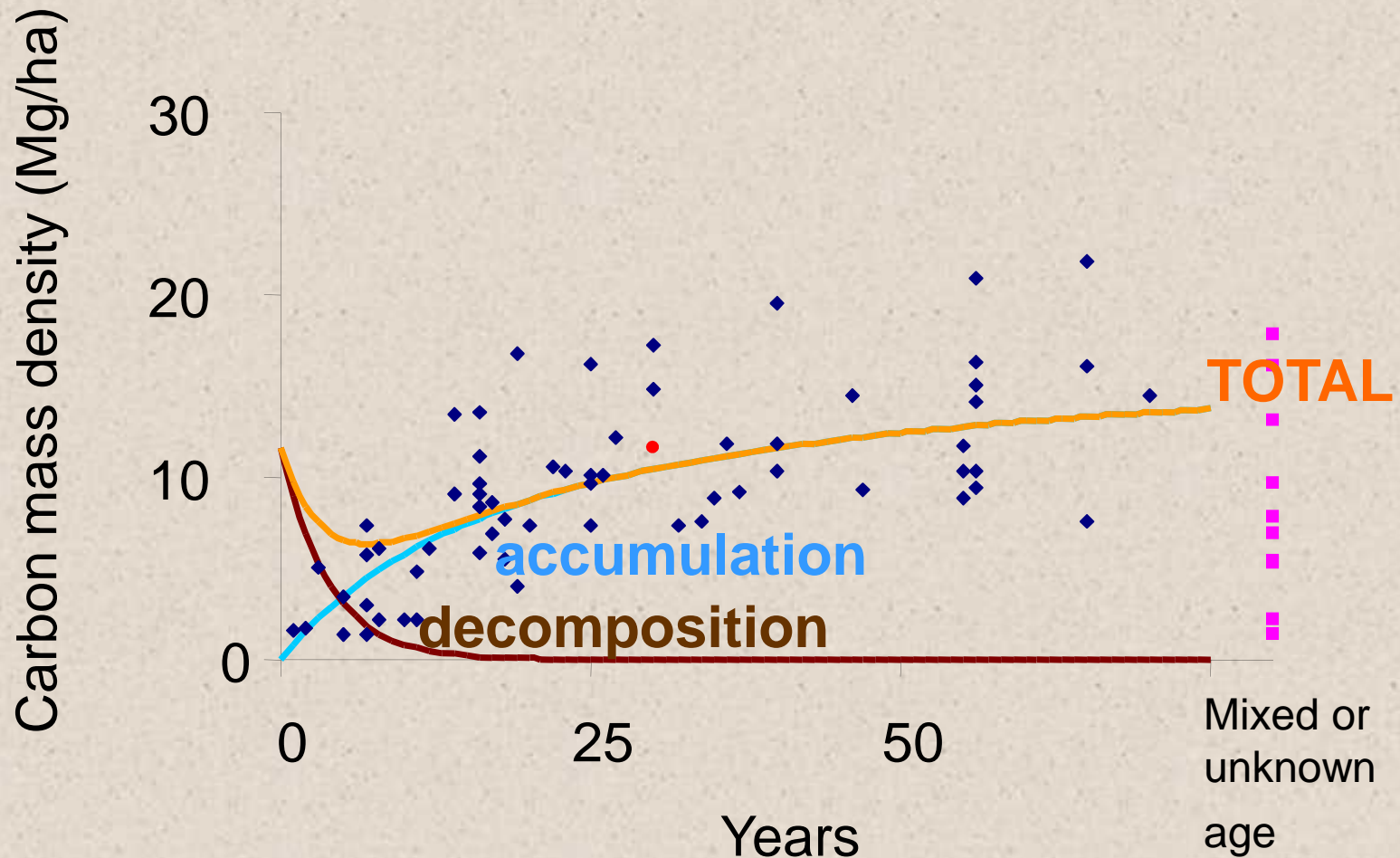
Examples of generalized equations for 6 select species groups



SOURCE: Jenkins and others, 2003

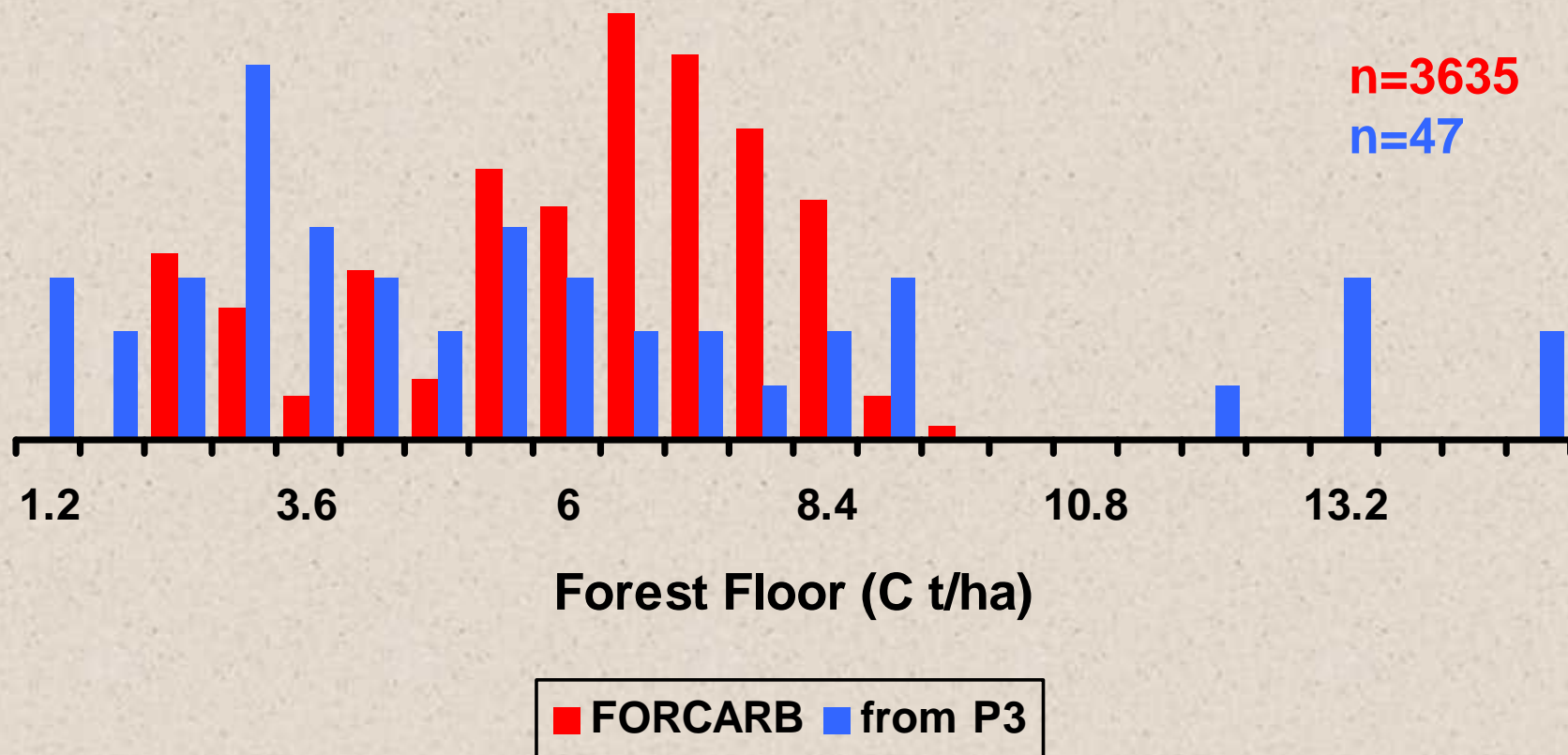
# Forest floor carbon accumulation, decay, and total

## Example: Southern pines

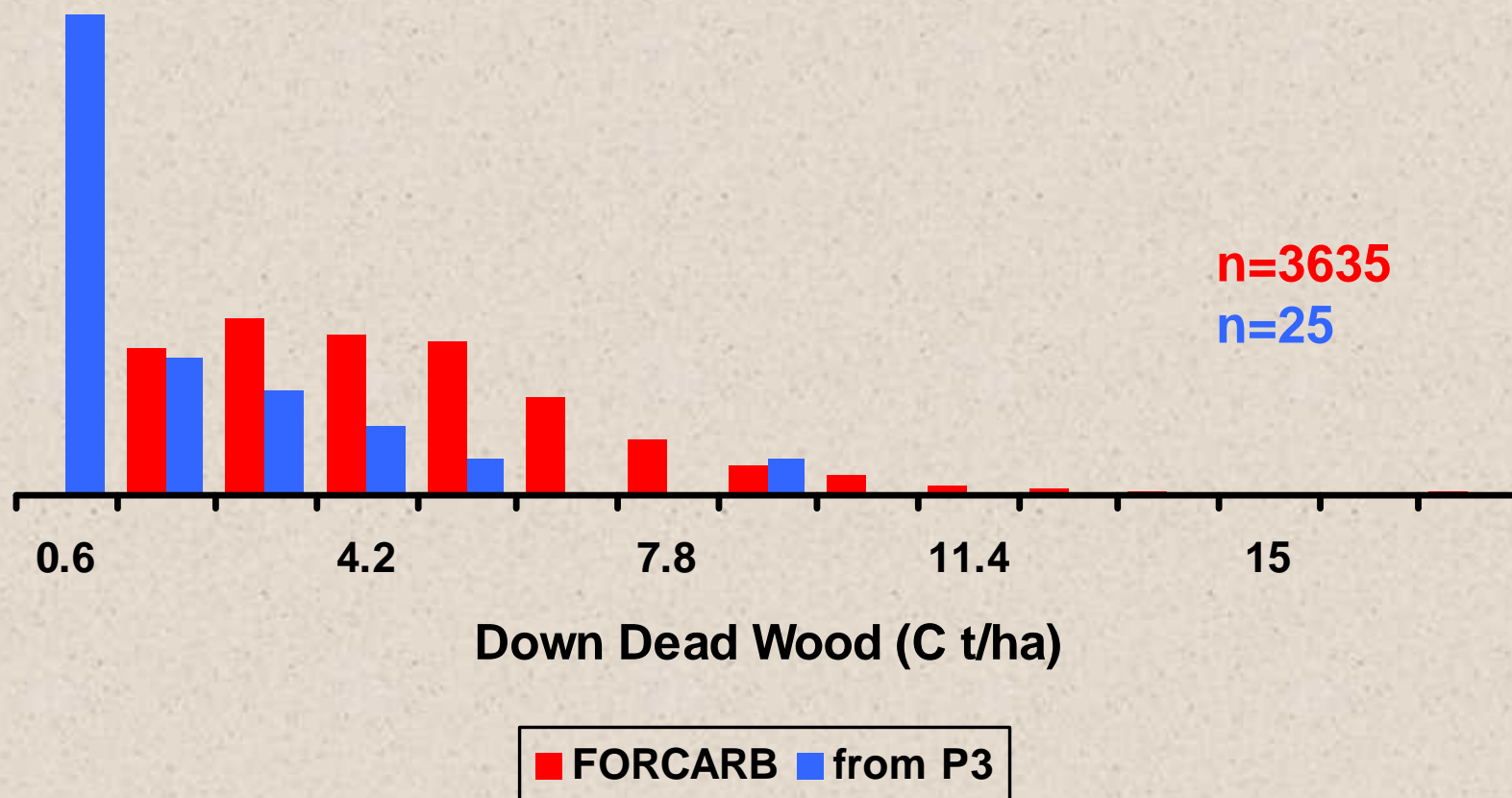


SOURCE: Smith and Heath, 2002

# Comparison of FORCARB results and available P3 data for South Central Bottomland Hardwoods,



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# 1605b Default Tables for Forestry

Carbon growth and yield tables

Based on regional averages from growth and yield of merchantable volume, FORCARB estimators, and FIA inventory data.

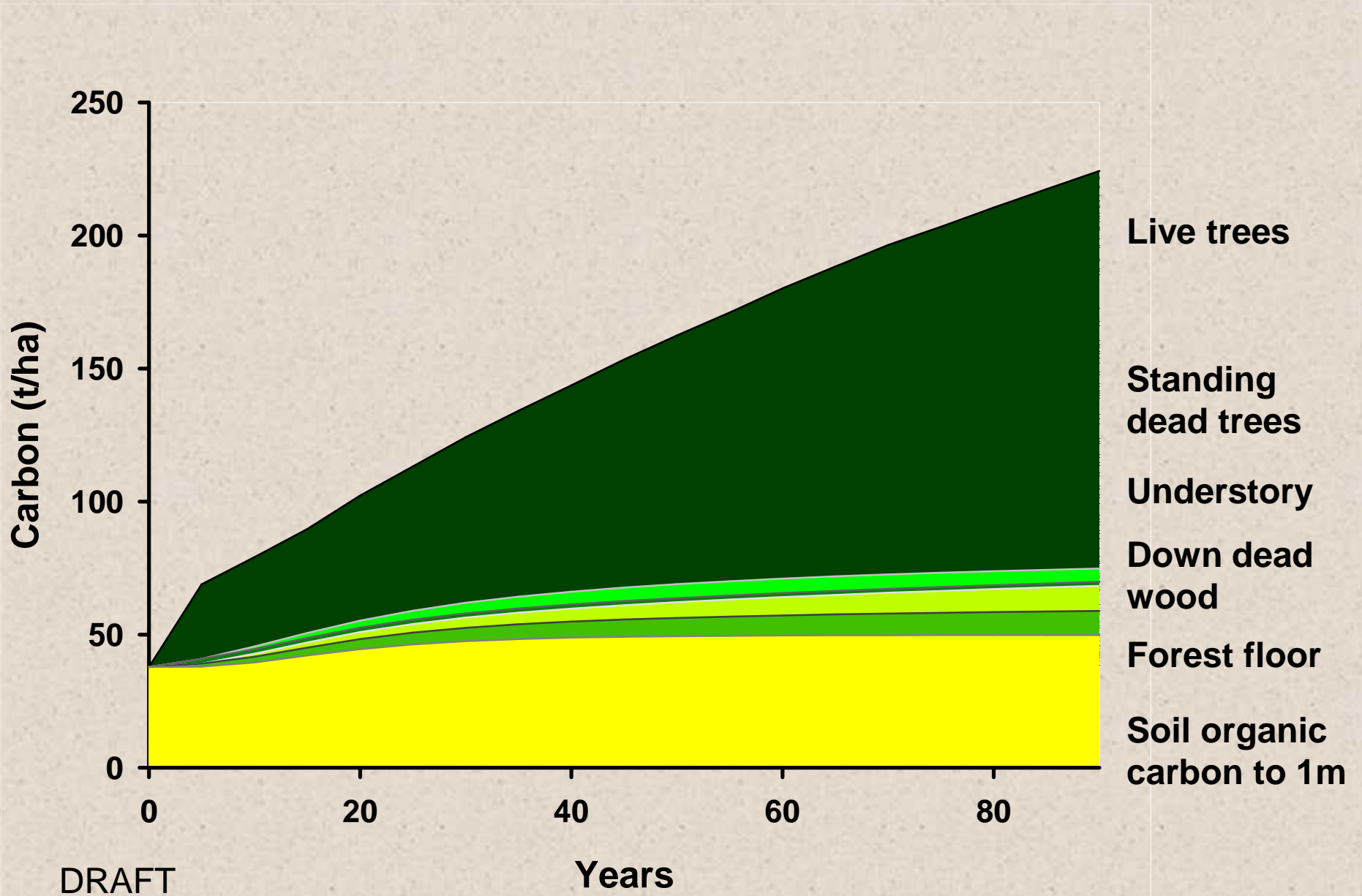


## Afforestation of bottomland hardwoods: DRAFT 1605b default table

Age	Mean Volume	Mean Carbon Density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
Years	m <sup>3</sup> /ha	Metric tons carbon per hectare						
0	0	0.0	0.0	0.0	0.0	0.0	37.9	0
5	0	29.3	0.0	1.7	0.0	1.1	38.0	32
10	11	34.7	1.0	1.7	1.1	2.1	39.6	41
15	23	40.2	1.8	1.7	1.9	3.0	42.2	49
20	39	47.9	2.6	1.6	2.7	3.7	44.5	59
25	54	54.9	3.2	1.6	3.3	4.4	46.3	67
30	71	62.9	3.8	1.6	3.9	5.0	47.6	77
35	87	70.3	4.3	1.6	4.4	5.5	48.4	86
40	104	77.9	4.7	1.6	4.9	6.0	48.9	95

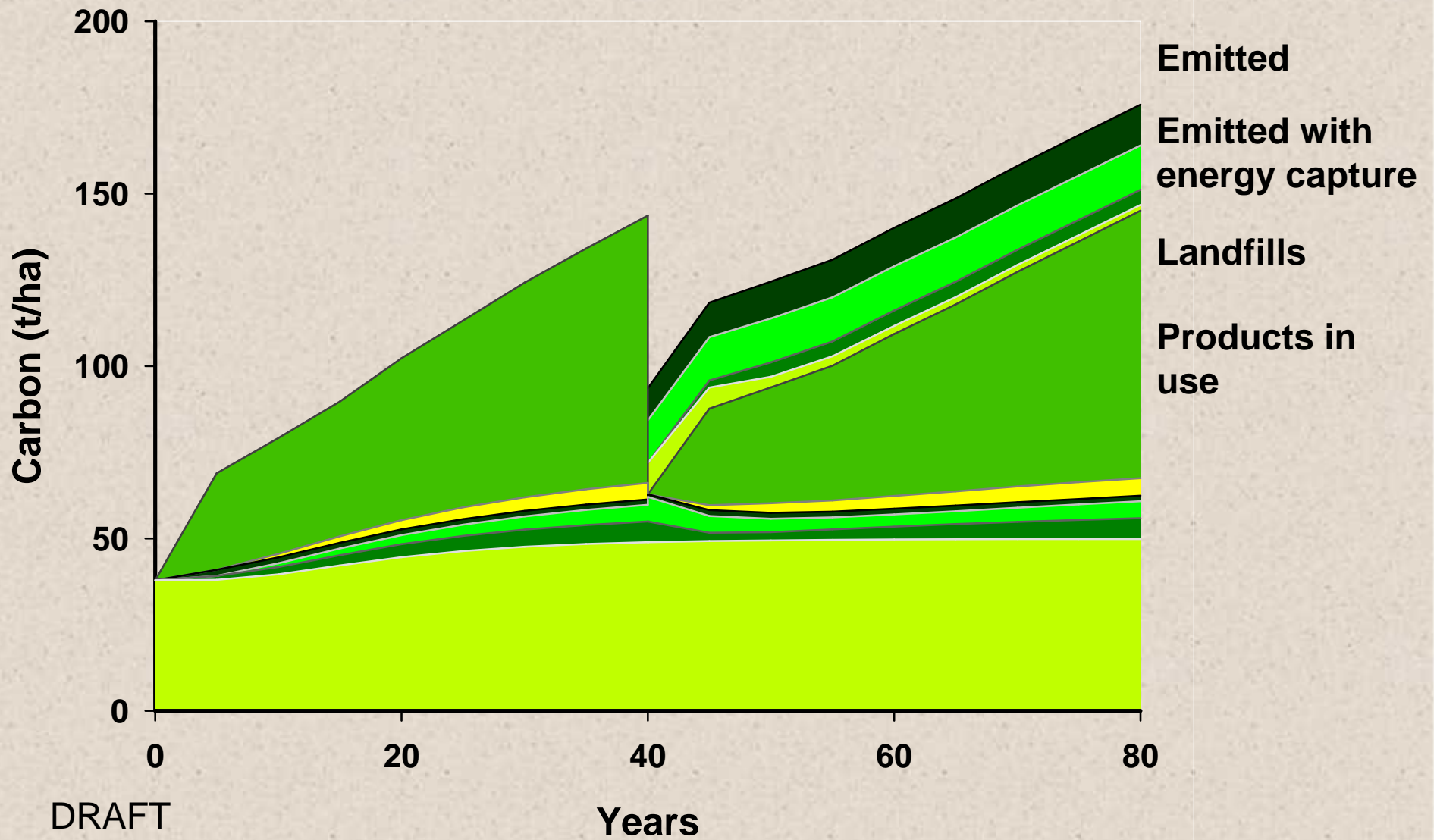
NOTE: These estimates are undergoing internal review.

# Afforestation of Bottomland Hardwoods, South Central U.S.



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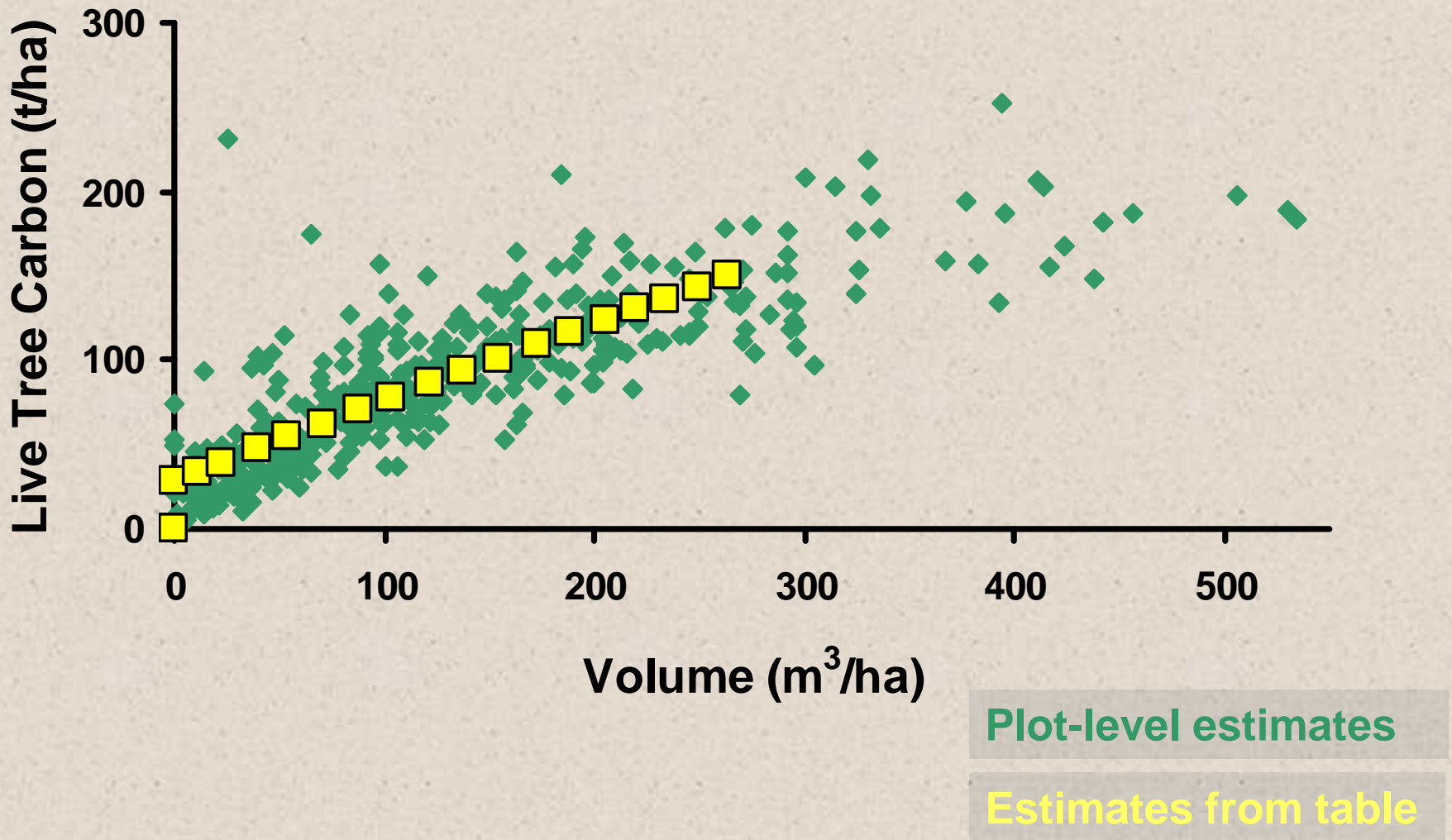
# Afforestation followed by harvest with carbon in harvested wood products - Bottomland Hardwoods, South Central U.S.



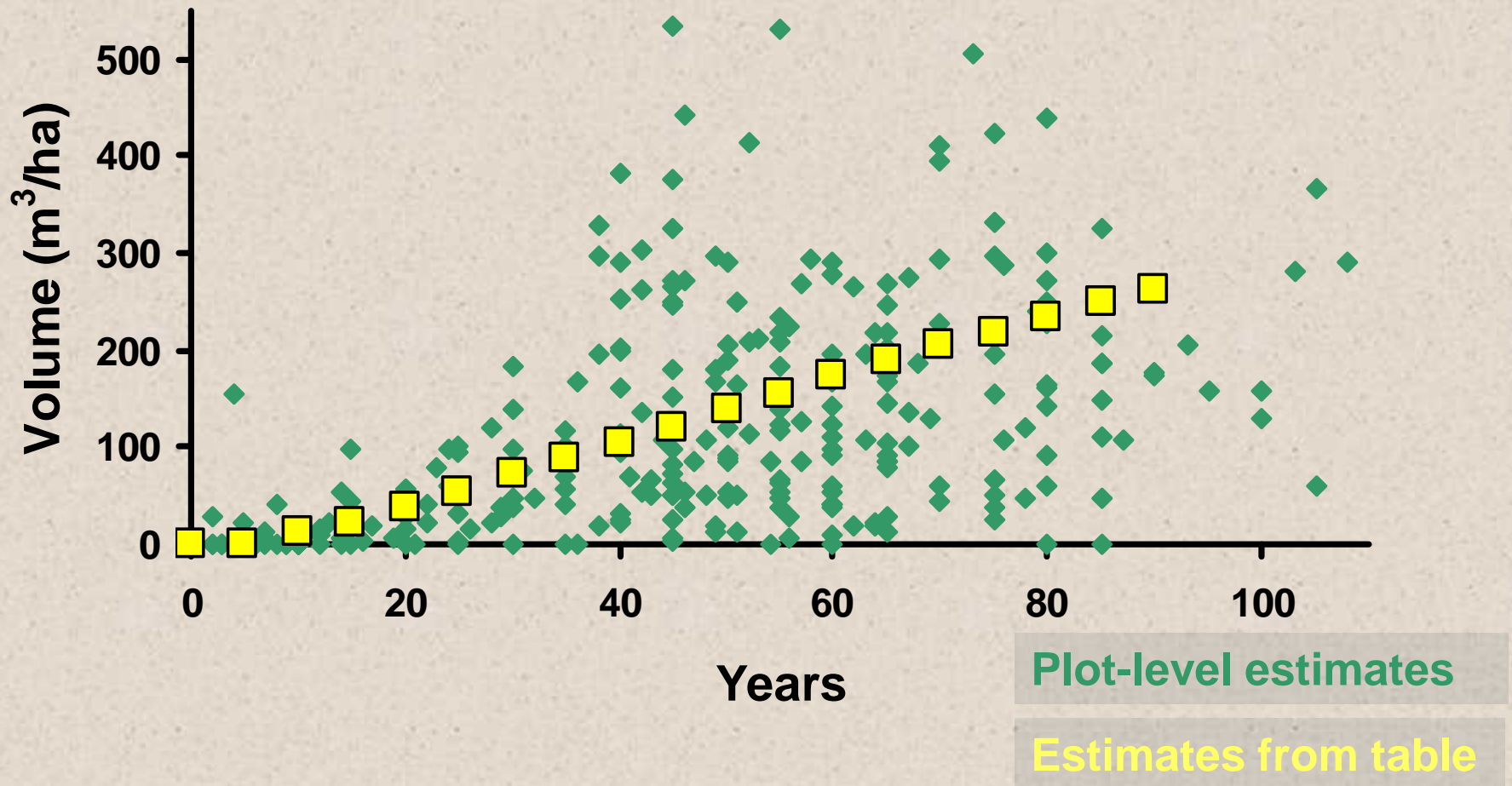
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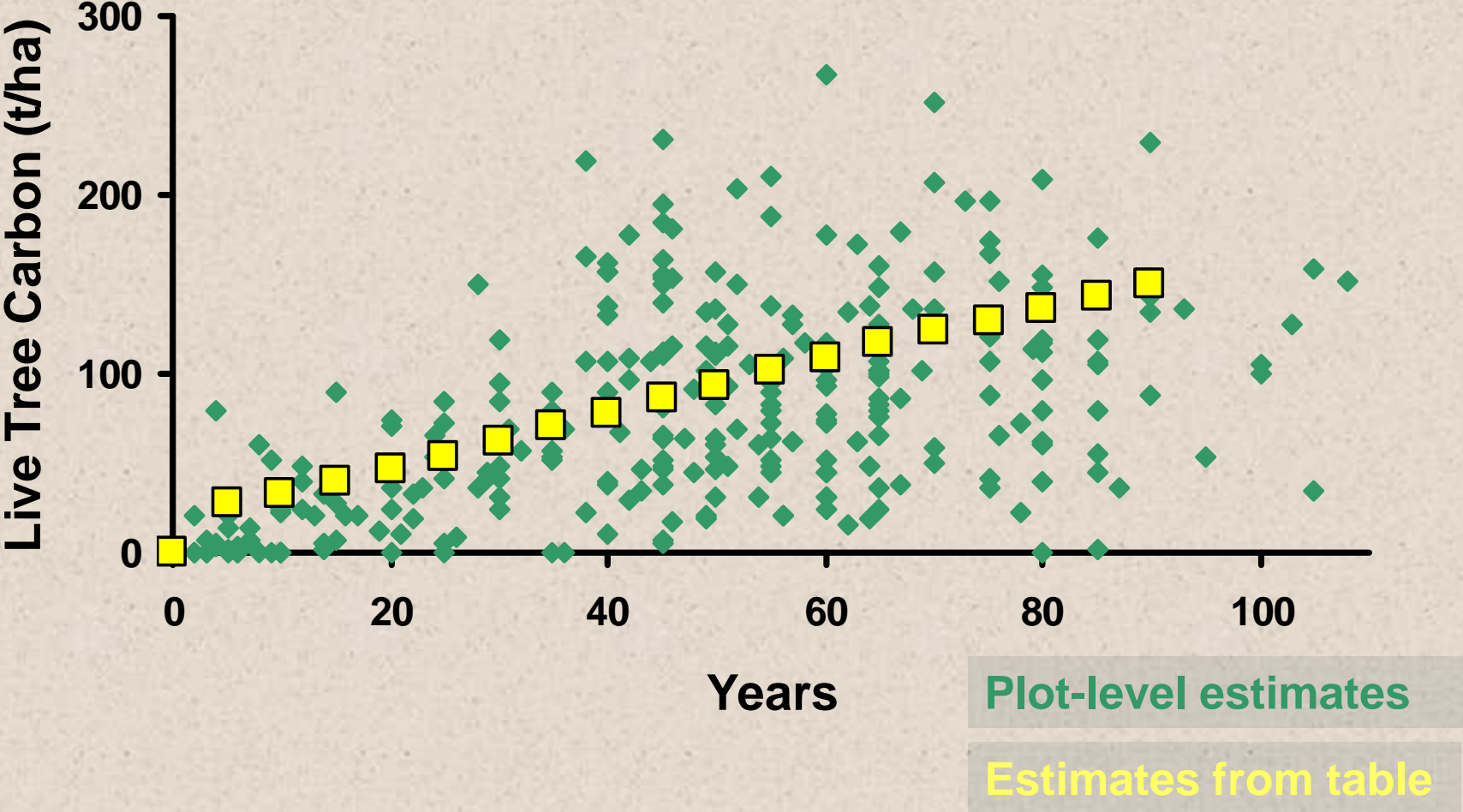
# Volume to live tree carbon from table relative to plot-level estimates - Bottomland Hardwoods



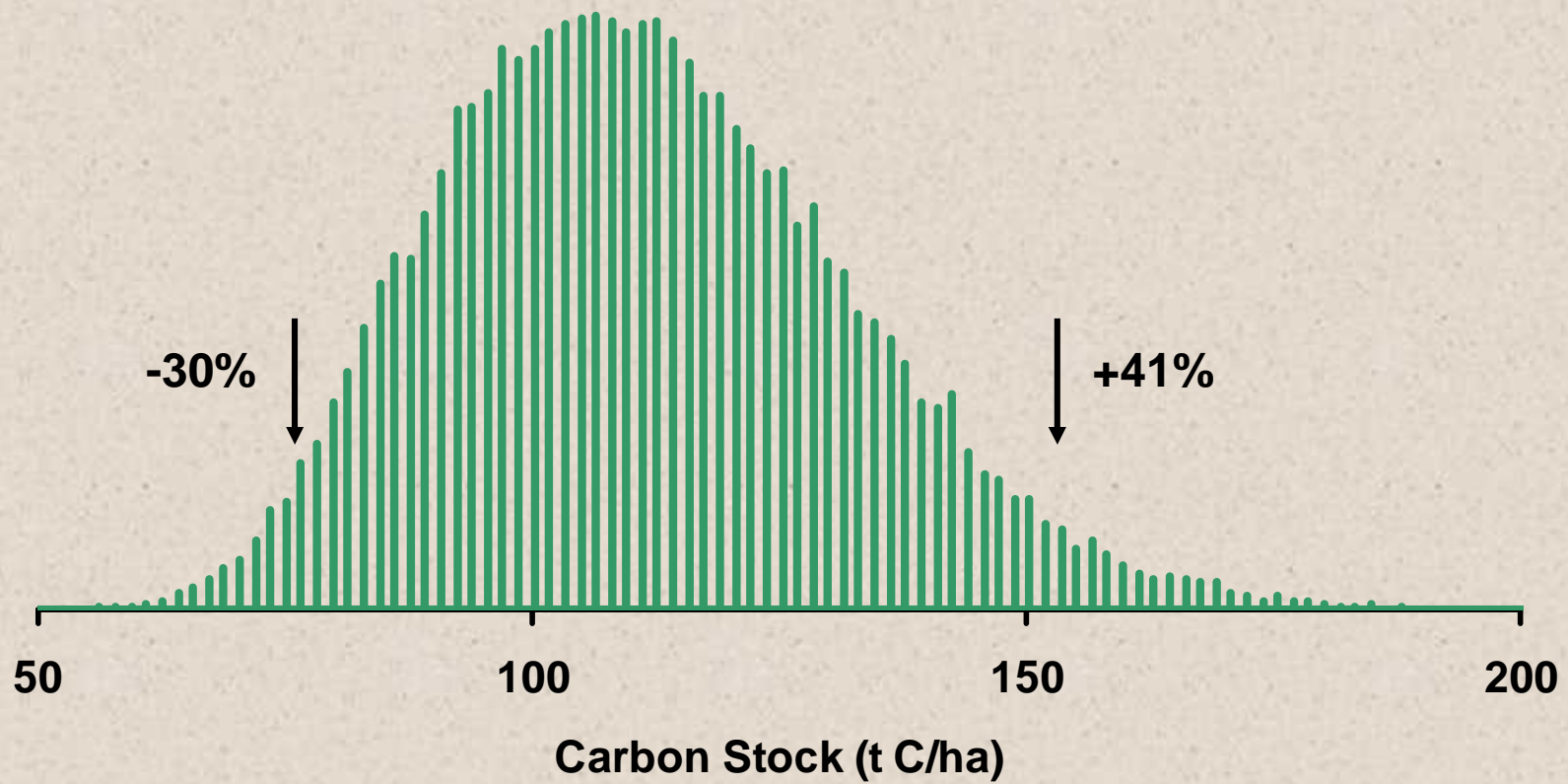
# Yield predictions from table relative to plot-level estimates - Bottomland Hardwoods



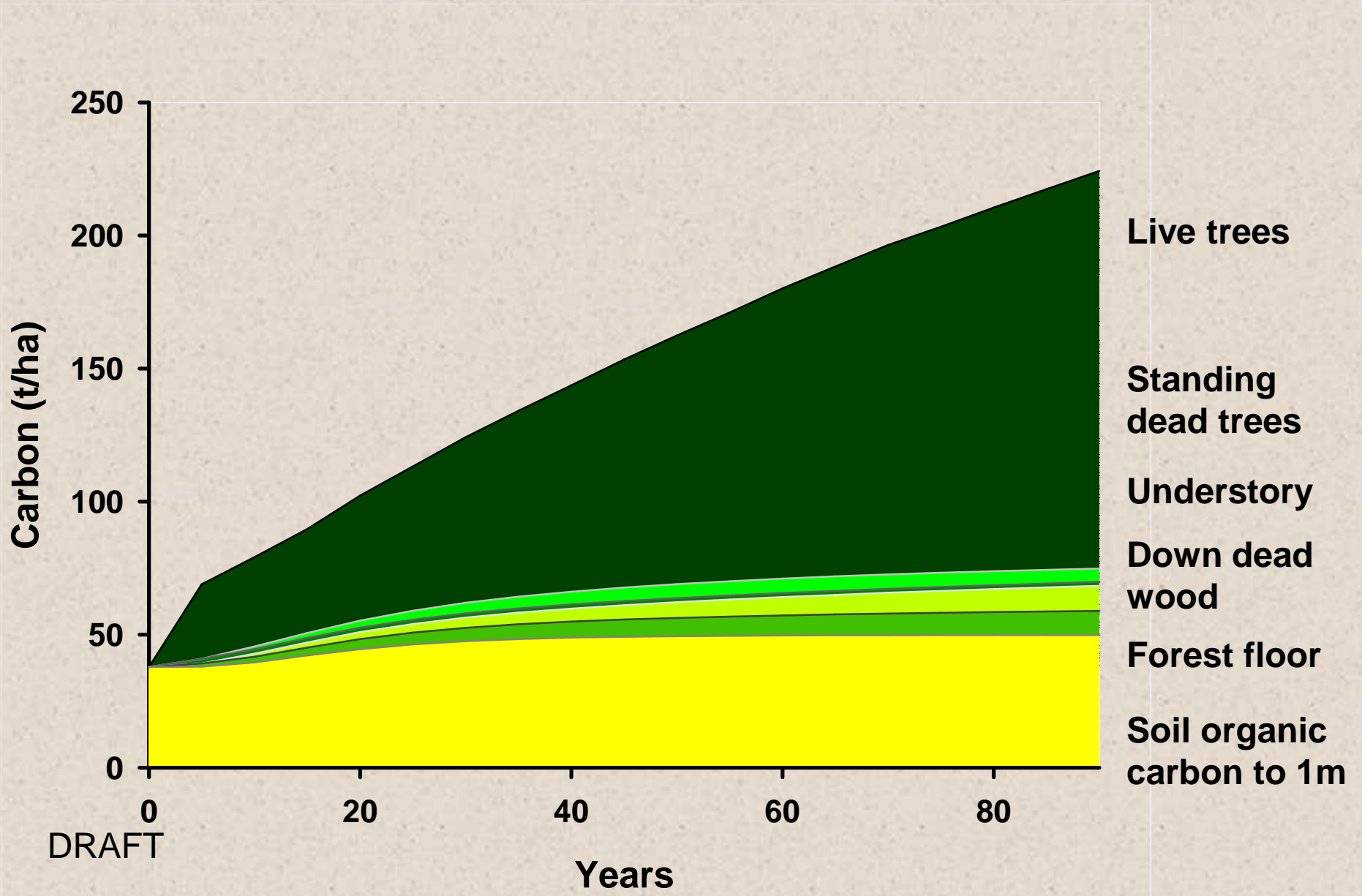
# Uncertainty from site-to-site variability for age-based predictions of live tree carbon Bottomland Hardwoods



# Uncertainty in total carbon stock at 20-years from Monte Carlo simulation - Bottomland Hardwoods



# Afforestation of Bottomland Hardwoods, South Central U.S.



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## Carbon sequestration in 2015

- 52,700 t C, based on the 51,900 acres identified as planted by the FIADB.
- To achieve 5 Mt C, need to plant 5,830,000 acres now.
- 474,000 t C, possible if 50,000 acres were planted each year from 1991 through 2000.

# Carbon sequestration in 2015

- 52,700 t C, based on the 51,900 acres identified as planted by the FIADB.  
**63% Live Tree**  
19% Soil  
18% Other
- To achieve 5 Mt C, need to plant 5,830,000 acres now.  
**52% Live Tree**  
24% Soil  
23% Other
- 474,000 t C, possible if 50,000 acres were planted each year from 1991 through 2000.  
**64% Live Tree**  
18% Soil  
18% Other

