



Economics of Wood Products

Speaker Background

- Pat Layton
 - Current position:
 - Director, Clemson Wood Utilization & Design Institute
 - Professor, Department of Forestry and Environmental Conservation, Clemson University
 - Credentials:
 - MS and PhD Forest Genetics
 - BS Forest Resource Management
 - Fellow, Society of American Foresters
 - Key experiences
 - 20 years at Clemson University as Professor, Chair and Director
 - 13 years in the pulp and paper industry
 - 4 years in biomass energy and 10 in learning wood products



Forest Change in the US South



Clemson Experimental Forest
Photo Archives



Cheesman Lake 1900

Prescribed fire/stocking issues

Natural fire-dominated landscape

South Platte 2002



Office of the Colorado State Forester, 2003-4

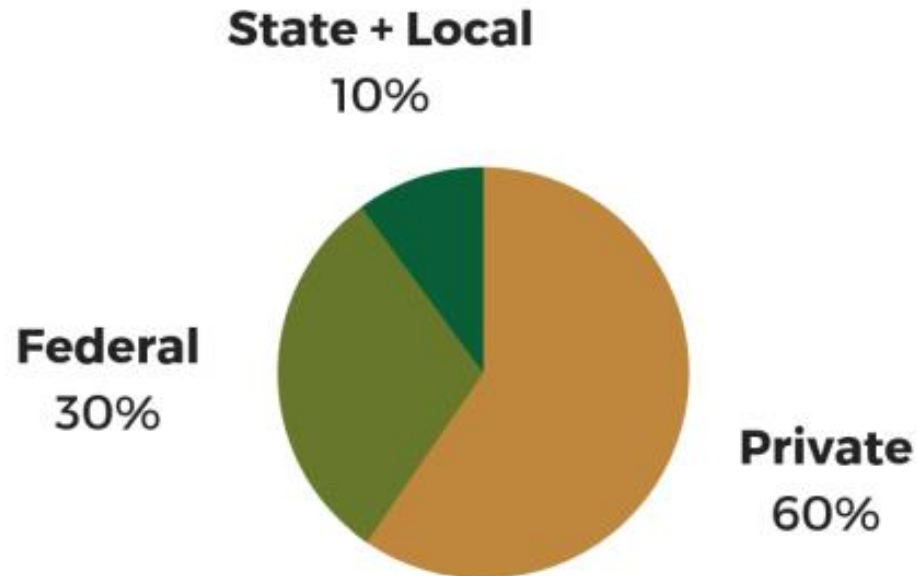


Denver Water



Sabrina Hall

Who Owns the Nation's Forest



FORESTLAND OWNERSHIP IN THE UNITED STATES

Data Source: FIA 2012

- Private entities own and manage 445 million acres
- Private corporate ownership - 147.4 million acres
- Private non-corporate ownership - 297.6 million acres
- More than 10 million private owners
- Highest % is family and individual – ave. 22 acres or less
- Private owners have differing goals for forest management

Area of Forest and Woodlands for Selected Regions, Types, Ownerships and Origins – Who Plants Trees

Forest-type group	All owners			National forest			Other public			Private corporate			Private non-corporate		
	Total	Planted	Natural origin	Total	Planted	Natural origin	Total	Planted	Natural origin	Total	Planted	Natural origin	Total	Planted	Natural origin
<i>Thousand acres</i>															
Longleaf-slash pi	12,999	7,200	5,799	1,192	258	934	2,282	650	1,632	5,423	3,891	1,532	4,102	2,401	1,700
Loblolly-shortleaf	63,904	34,202	29,702	3,309	514	2,795	2,896	708	2,188	26,123	19,674	6,448	31,575	13,305	18,270
South total:	245,513	48,236	197,277	13,130	878	12,251	20,131	1,749	18,382	69,114	26,730	42,384	143,139	18,878	124,261
53%															
Pacific Coast:															
Douglas-fir	21,087	8,130	12,957	7,344	1,304	6,040	4,171	1,425	2,746	6,390	4,630	1,759	3,183	771	2,412
Ponderosa pine	9,493	1,189	8,304	5,121	664	4,457	683	35	648	1,516	379	1,136	2,172	110	2,062
Fir-spruce	52,251	390	51,861	6,027	191	5,837	21,567	24	21,543	22,013	159	21,854	2,643	15	2,628
Pacific Coast total:	213,549	12,977	200,572	48,502	3,070	45,431	95,907	1,841	94,066	49,349	6,727	42,622	19,792	1,339	18,453
38%															
United States:	765,493	68,005	697,488	144,868	5,126	139,742	177,143	5,197	171,946	155,748	34,666	121,082	287,733	23,015	264,718
9%															

Forest Resources of the United States, 2017

95% of planted pines in South are on private land
66% of planted Douglas-firs are on private land

US Forests are data-rich. The USFS, States and others provide these data to all.

Internet searches can provide many analyses, but look closely as not all data are equal, i.e. time frame or measured the same. Changes through decades may be significant, e.g., the change in corporate landownership from the 1990 to 2010.

SC Landowners - Managed Forests

Private Corporate

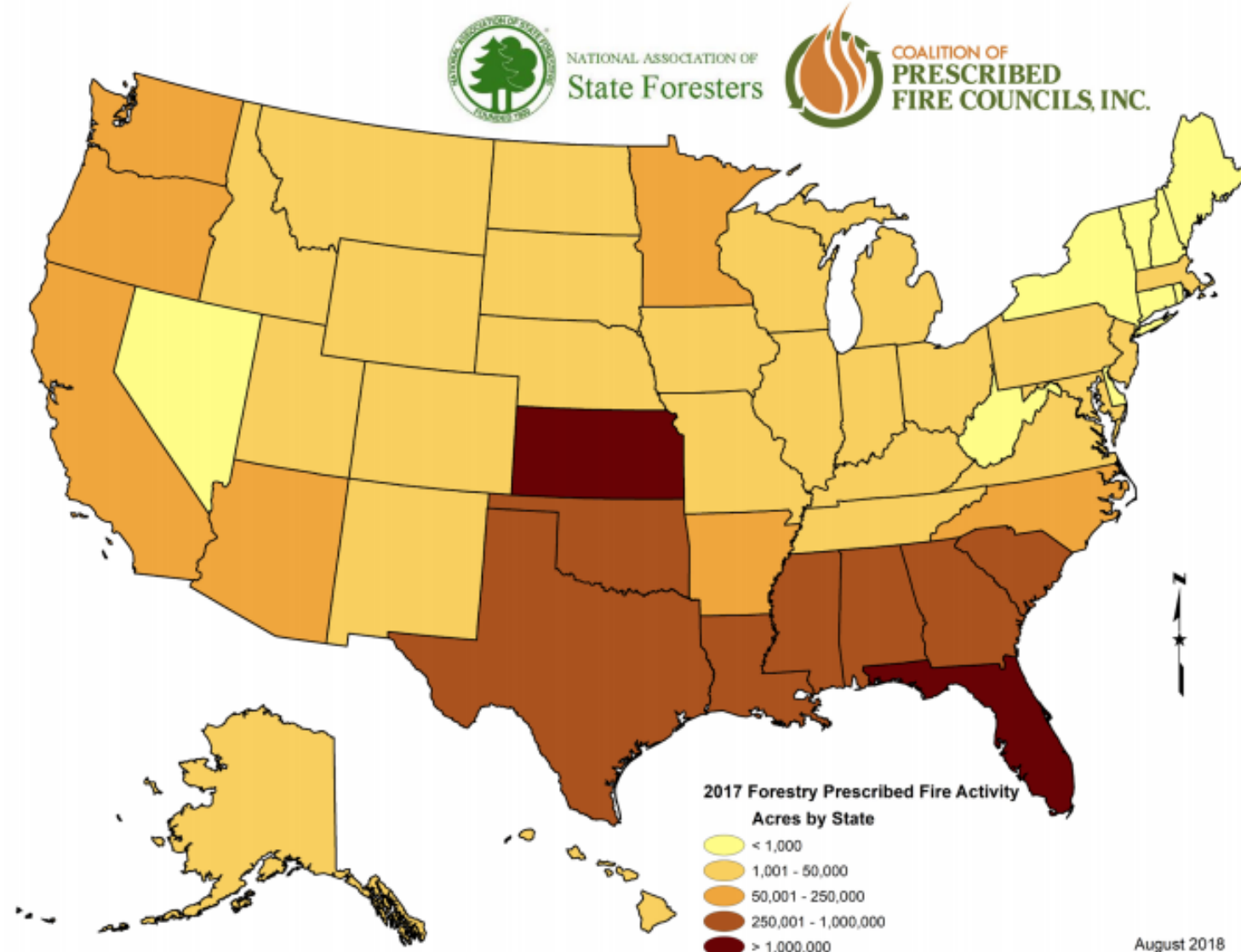


Private Non-Corporate



Photos by Pat Layton

Prescribed Fire Use for Forestry Objectives by State in 2017



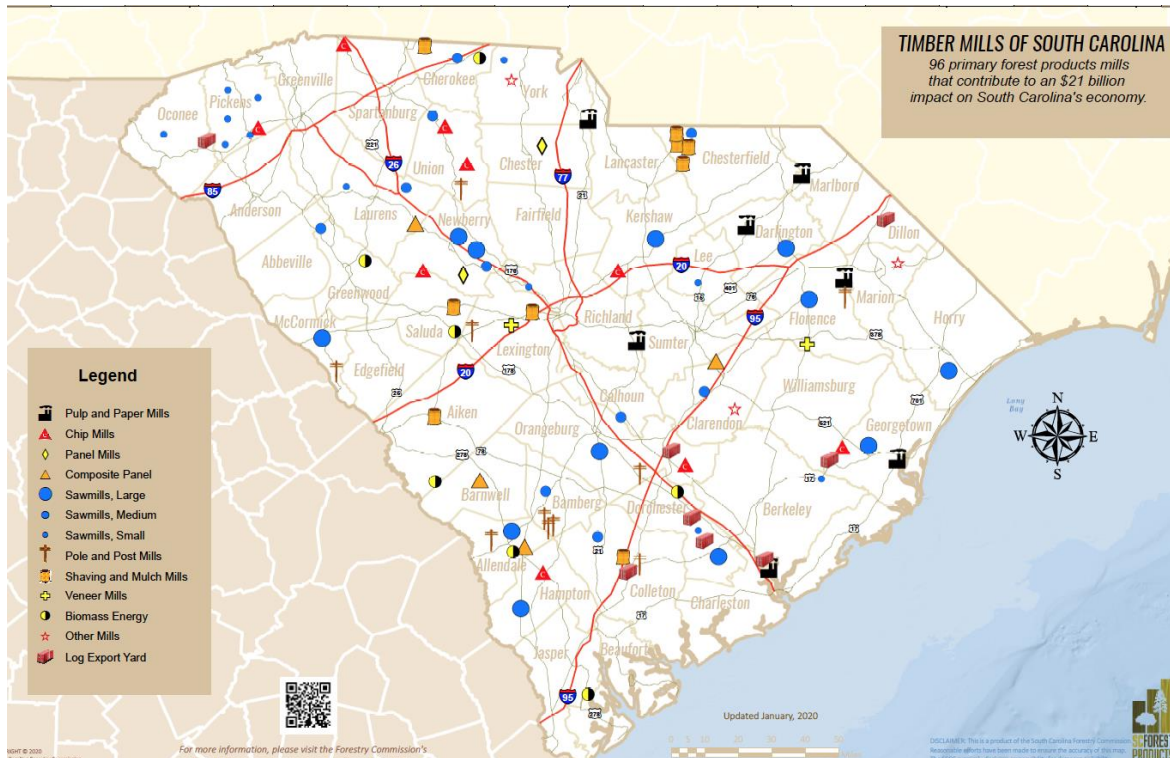
Economics of the system

- Transportation of water and air is expensive.
- Logs when harvested are half water
- Logs are often merchandized on site
- Products are transported to mills
- Merchandizing on site may vary by the type of mills that are close
- Reducing embodied carbon begins by reducing hauling distance



Photos by Pat Layton

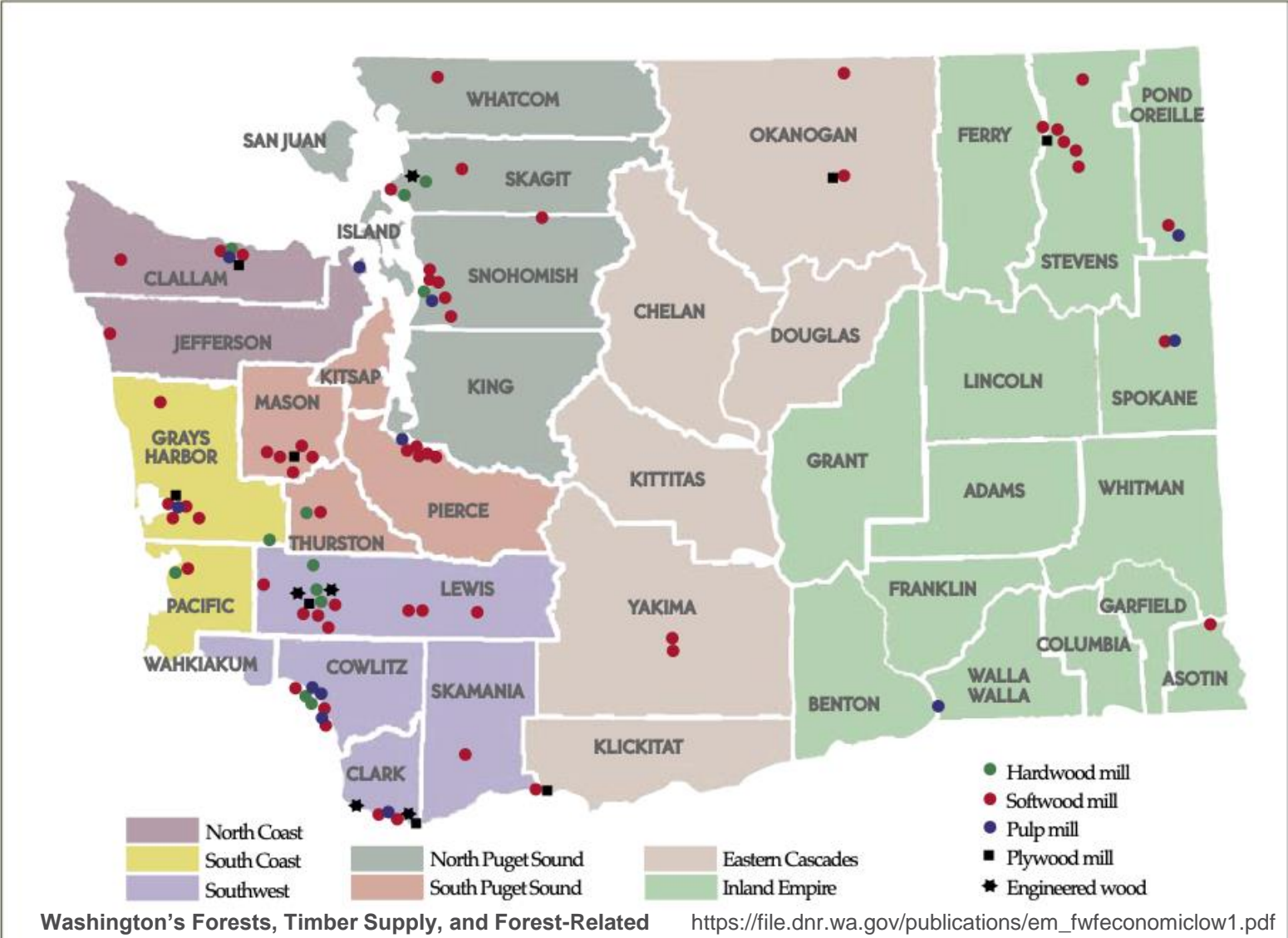
“Wood Baskets” for Mills



SC Forestry Commission

- A wood basket is the area around the mill from which logs are received
 - In the SE most logs with 50 miles
 - More than 75 miles is rare for pine
- Wood baskets can overlap
 - Different types of mills
 - Competition
- Distance from the mill impacts
 - Price paid to landowner
 - Carbon emitted in transportation

Washington State Wood Processing Facilities by Timbershed



Modern Softwood Sawmills – What Logs Are Harvested



Courtesy of Collum's Lumber Products, LLC

- \cong 10% or fewer mills in the SE take logs with butt diameters $\geq 28''$
- Only 8 mills take these sizes in the PNW ($\cong 9\%$) (source Forest2Market)
- Size matters to the efficiency of sawmills
- Markets drying up for big logs
 - Export Markets
 - Pole/Pilings

Grading and Sorting

- Every log is processed into multiple products depending on log quality and size
- All boards from each log are sorted by size and then dried
- Dried stacks are then planned, graded to standards, trimmed to enhance grading, restacked by size, packaged and shipped
- Shipping dried, well-stacked lumber to distribution centers reduces costs and fossil-based carbon



Courtesy of Collum's Lumber Products, LLC

Grade Marking Southern Pine

Grade Mark Key

1. Registered Trademark
2. Grade of Lumber
3. Moisture Content
4. Mill Identification Number
5. Heat Treated for Pest Pasteurization

1 → SPIB® No. 1 ← 2
3 → KD19 HT 7 ← 4
5†

Grade Marking Western Wood Products



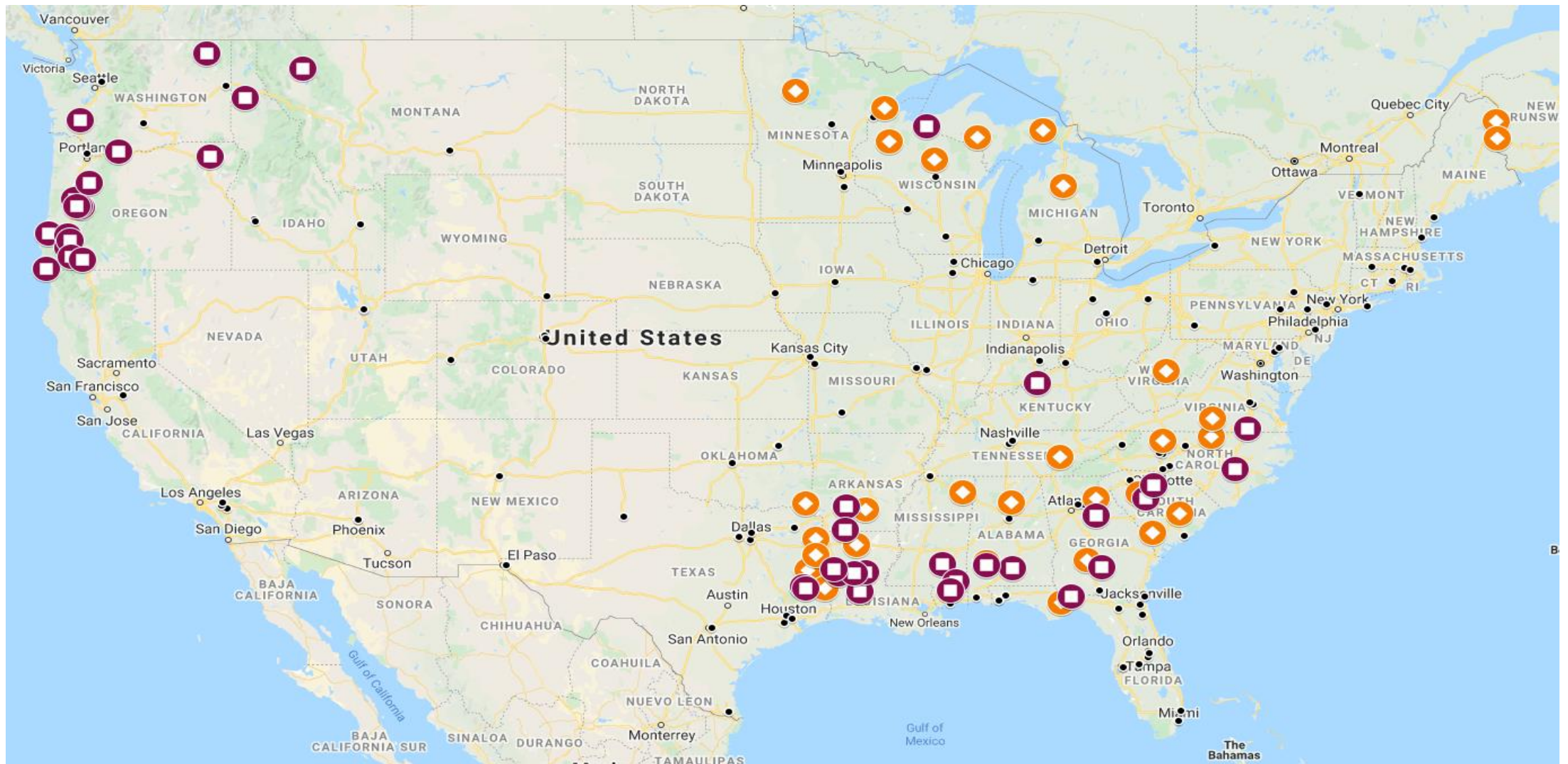
- WWPA certification mark
- 12 – Mill ID
- Stand – Grade Identification
- Species
- Seasoning
 - Includes type of drying and moisture content



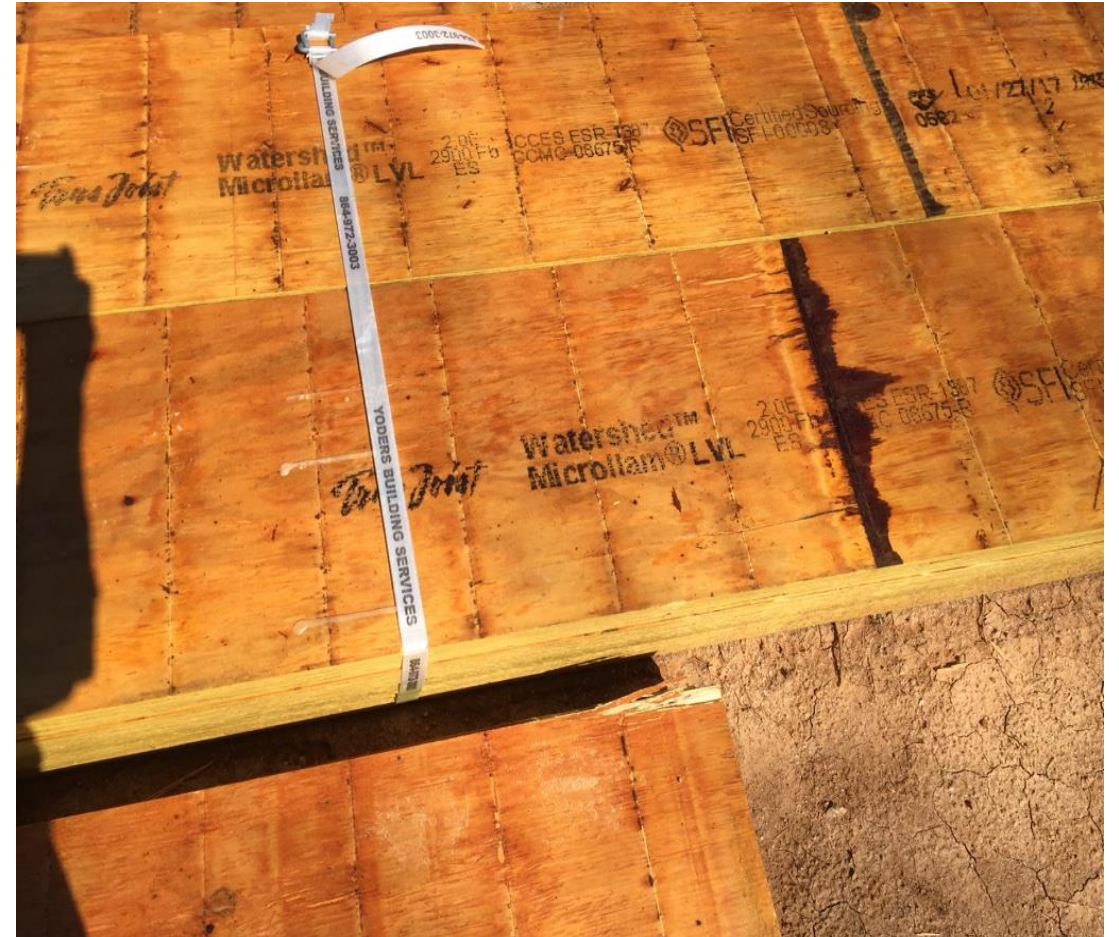
Distribution Centers and Softwood Dimension Lumber Mills



Distribution Centers, Plywood (squares) and OSB (diamonds) Mills



Distribution Centers to Building Suppliers to Job Sites



Photos by Pat Layton

Mass Timber – Sawmill to Secondary Manufacturer



Structurlam Mass Timber Products

Photos by Pat Layton

Manufacturer to Mass Timber Buildings

UMASS: Total SQ FT: 76,030

76 Truckloads delivered to jobsite

1,025,808 bd ft of Mass Timber: 245,136 Glulam Beams + 780,672 CLT.

Interestingly, for this project, which used HBV connectors to create composite floor slabs, the steel accounted for 20% of the material structural cost (not accounting for labor)

Platte 15: Total SQ FT: 128,410

70 Truckloads delivered to jobsite

1,013,940 bd ft of Mass Timber: 559,680 Glulam Beams + 454,260 CLT

Quattlebaum: Total SQ FT 16,500

354,000 bd ft of Mass Timber: 72,000 bd ft Glulam Beams + 282,000 bd ft of CLT (885 -- 20" dbh trees)



NORDIC

Cooper Carry



Quattlebaum Building - Wood Sources

LEGEND

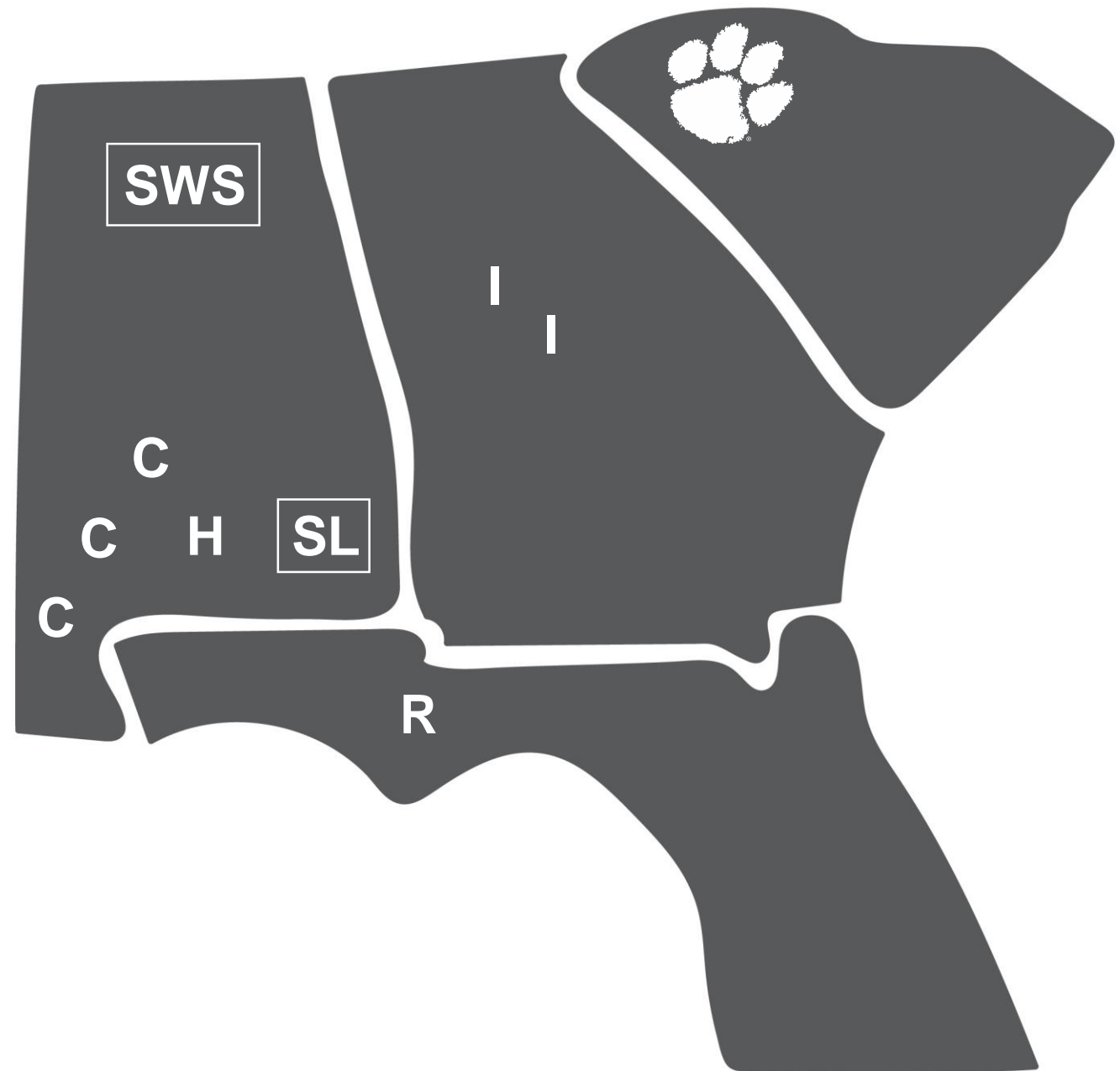
SmartLam (SL) - CLT

- C = Canfor (60%)
- R = Rex Lumber (20%)
- I = Interfor (15%)
- H = Harrigan Lumber (5%)

% = percentages of lumber used in CLT

Structural Wood Systems (SWS)

- All glulam lumber provided by Canfor in Fulton, AL

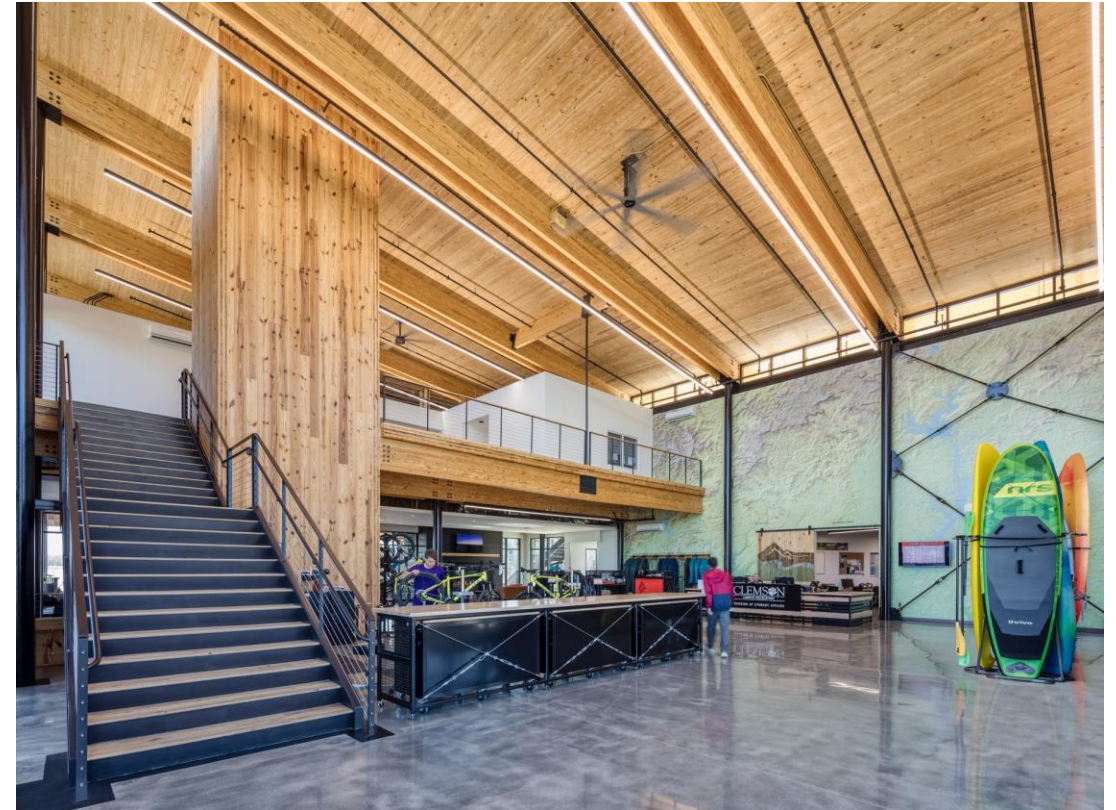


Influencing Carbon in Wood Products

- Use certified wood sources, C of C for mills, distributors, secondary manufacturers
 - Carbon being incorporated into the standards
- USFS wood is not certified but does need markets
- Private landowners and wood production
 - Landowner objectives differ significantly
 - All ecosystem services are critical – water, air, habitat, diversity
- Not all lumber is equal, even from a single tree
- Wood selection
 - Local or not?
- Off-site/premanufacturing
- Design for reuse/deconstruction

Understanding Trees and Embodied Carbon

- Live trees sequester carbon up to a certain age
- Not all US forests produce wood for buildings
- Ecosystem services from managed forests are important
- Deforestation is not “sustainably managed forestry”
- Using wood in building, consider the whole life of the building
- Fossil fuel prices dominate the economics of wood/lumber



Cooper Carry