



Forest Bioenergy in Georgia



Nathan McClure

**Georgia Forestry
Commission**

1-800-GA-TREES

www.gatrees.org



Approach

- *Georgia in a global context*
- *Forest resources and management*
- *Forest industry status*
- *New bioenergy industry*
- *Supporting organizations*



Southern US Forests in a Global Context

•Boreal (taiga) and temperate native forest

- Mainly softwood
- Few species
- Extensive forestry
- Sustainable management

•Native tropical forests

- Hardwoods
- Many species
- Non-sustainable forestry

•Plantation

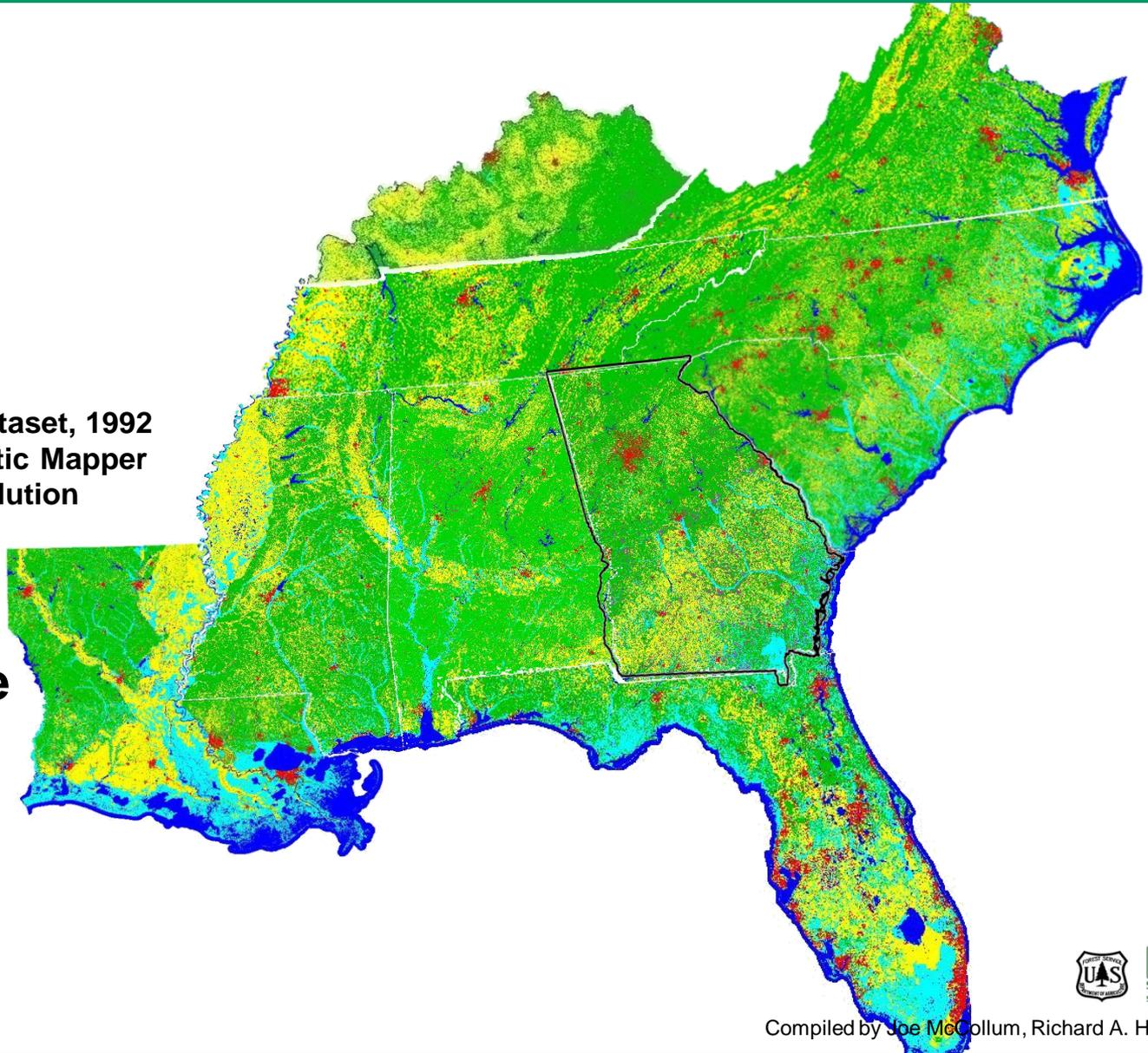
- Hardwoods and softwoods
- Few species
- Very intensive forestry
- Sustainable



64% of US Wood Products
15-20% of Worlds Wood Products

Forests Dominate Georgia's Land Use

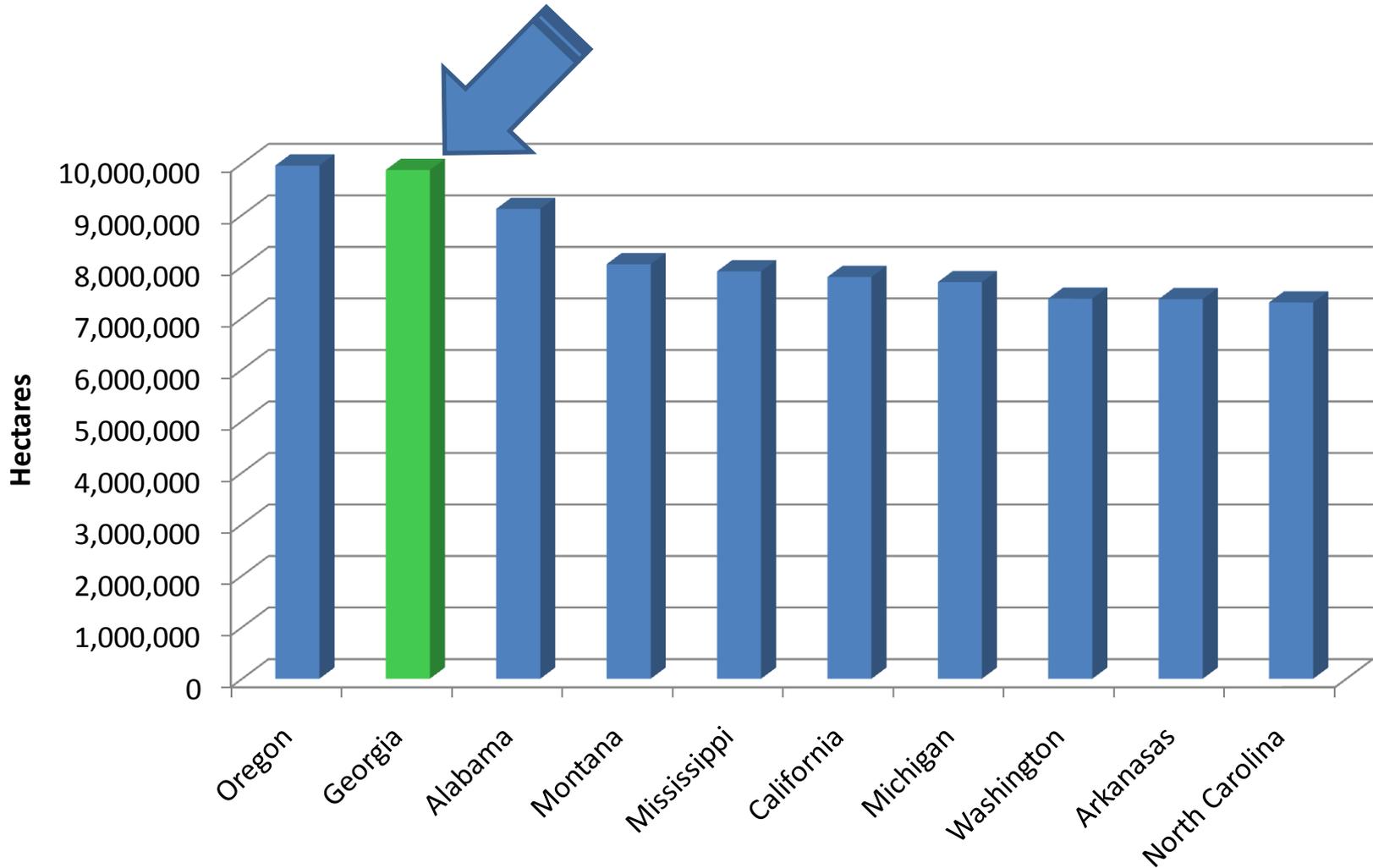
U.S. Geological Survey
National Land Cover Dataset, 1992
Classification of Thematic Mapper
Based on 30 meter resolution



-  Forest
-  Agriculture
-  Water
-  Wetland
-  Urban
-  Rock/Sand



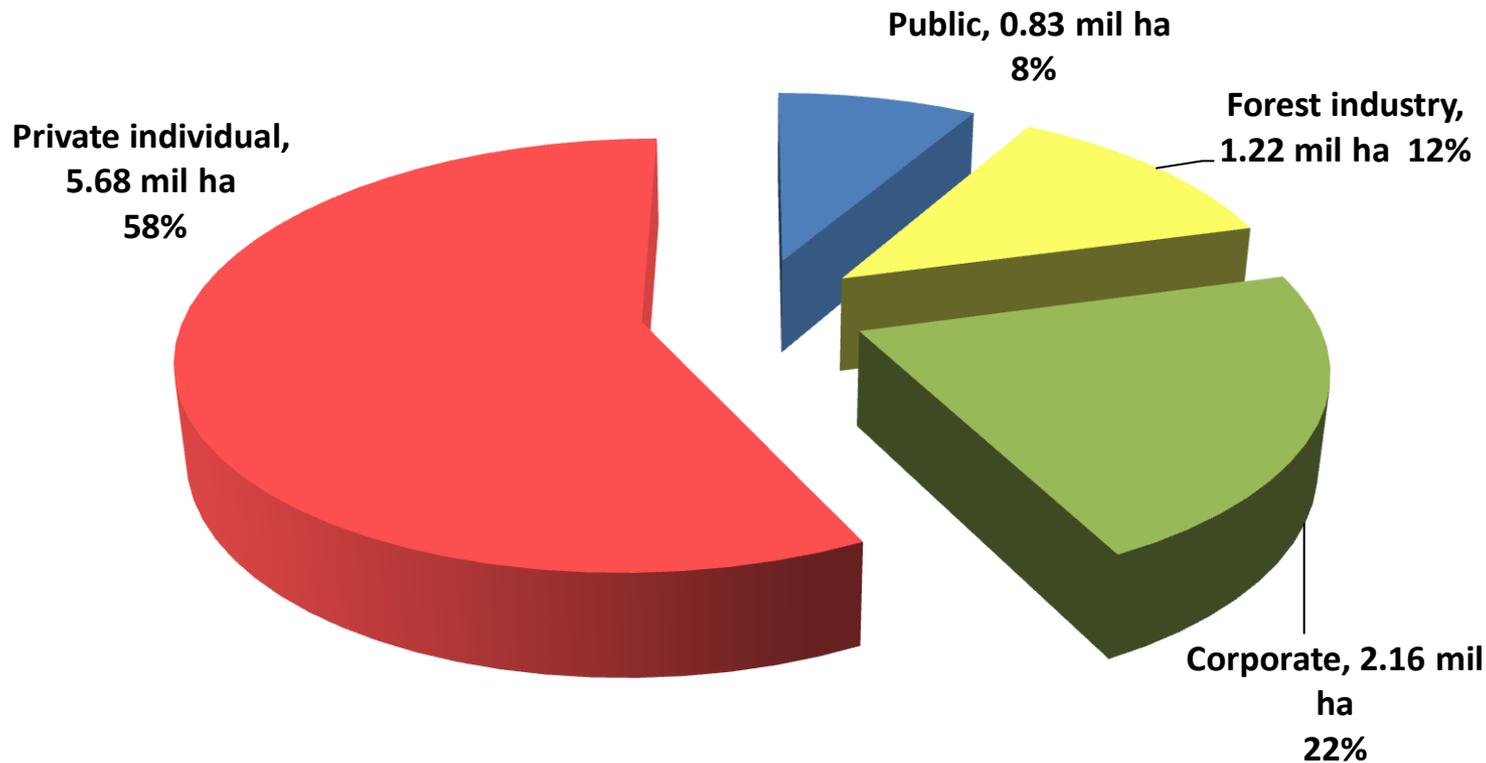
Top Ten US States in Total Timberland



Source: US Forest Service Mapmaker 3.0 database, data query 7/25/2008



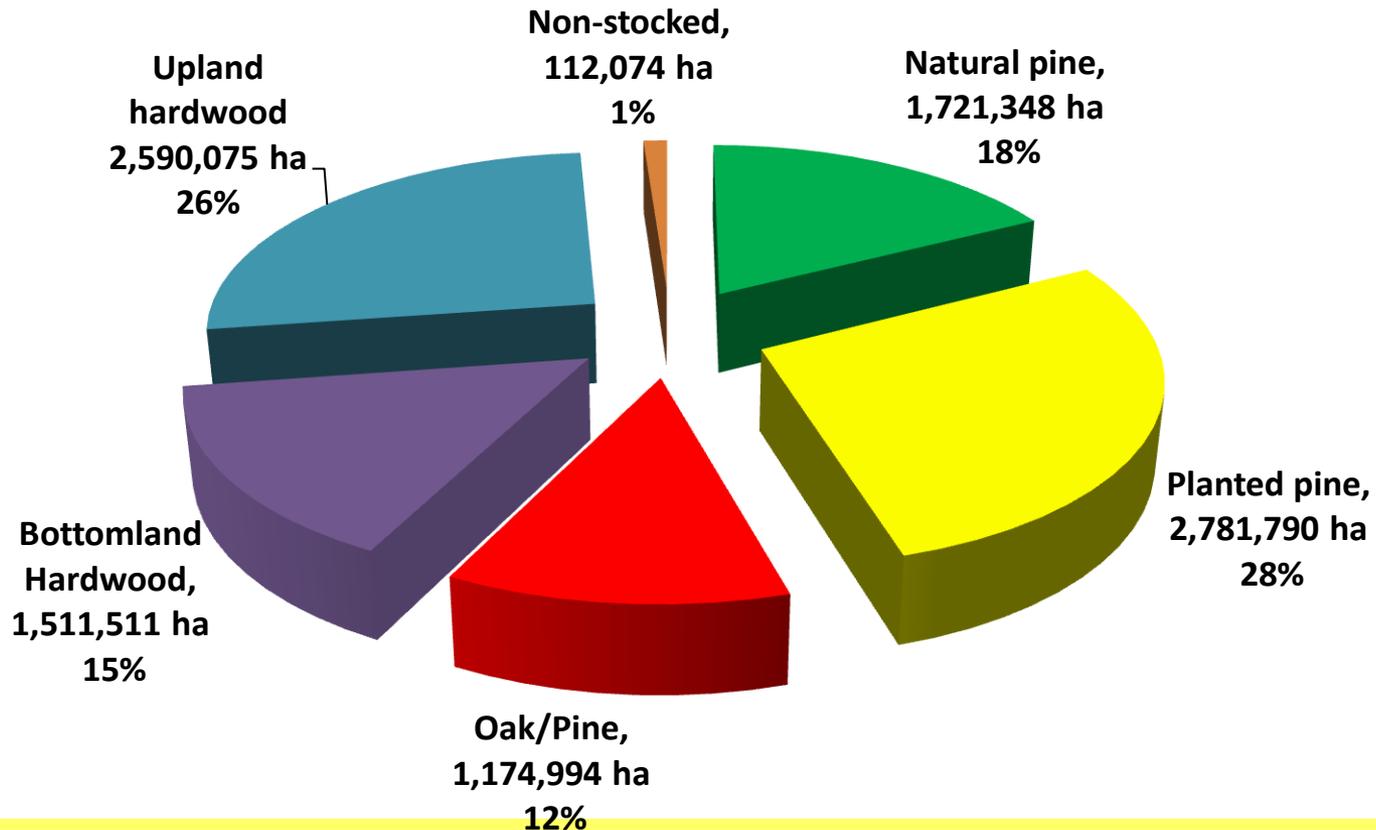
Timberland Ownership in Georgia



Source: Forest Inventory and Analysis program, US Forest Service, 2008 data



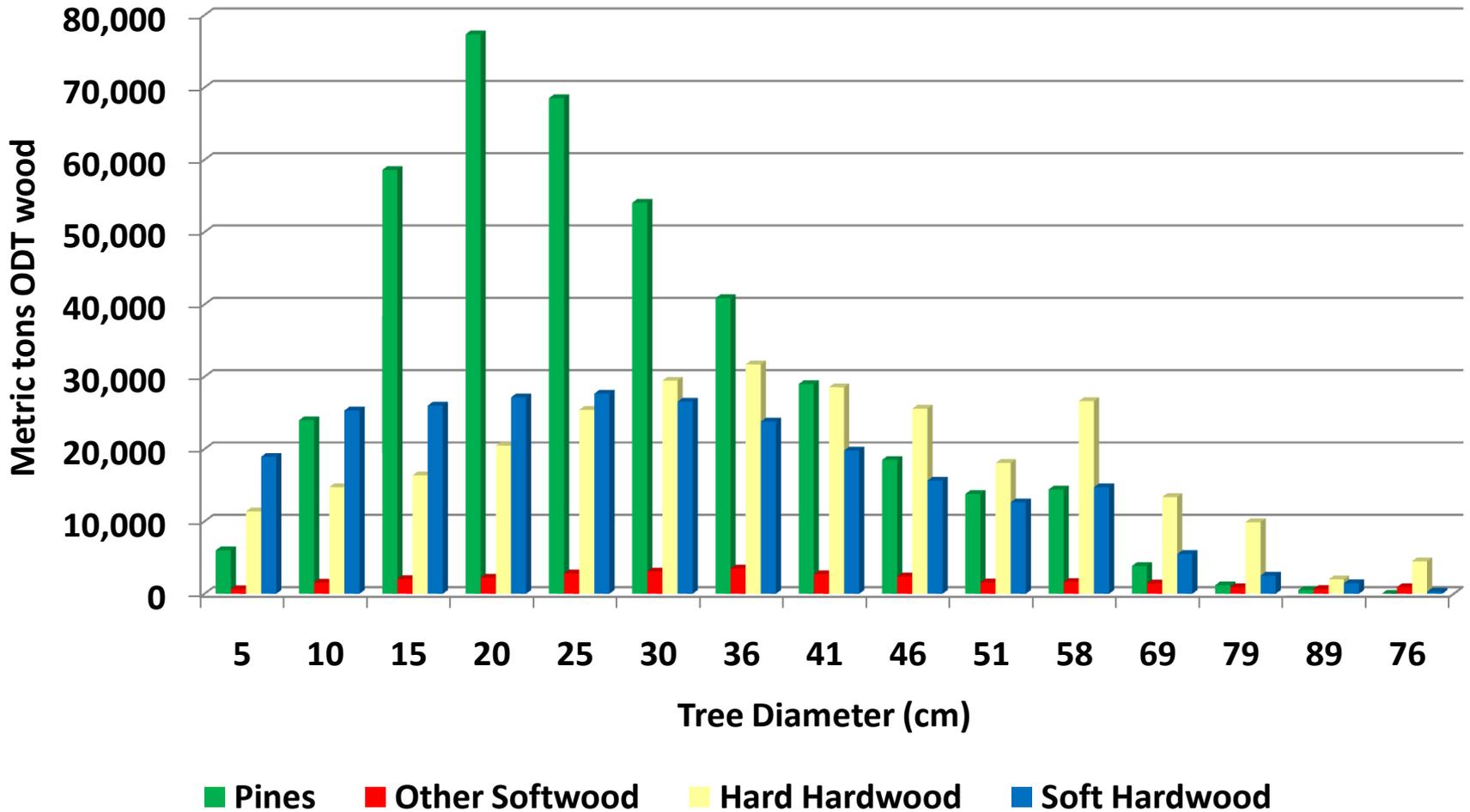
Forest Types in Georgia



Softwoods: 10 species of pine, cypress, juniper

Hardwoods: 15+ species of oak, yellow poplar, sweetgum, tupelo gum, red maple, hickory, etc.

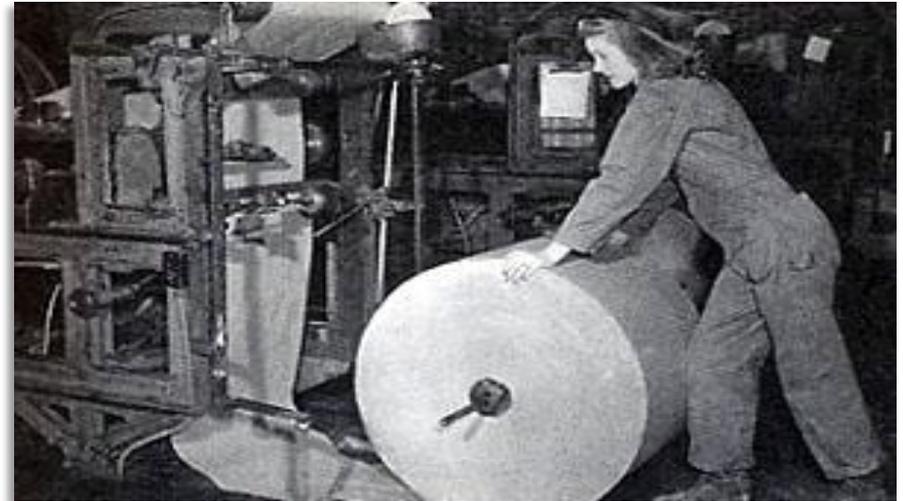
Forest Biomass Amounts by DBH and Species



Source: Forest Inventory and Analysis program, US Forest Service, 2008 data



Long History of Production in the Forest Industry





Forest Types and Forest Harvesting





Reforestation in Georgia



UGA0908084



Managing Forests in Georgia





Managing Forests in Georgia





Managing Forests in Georgia



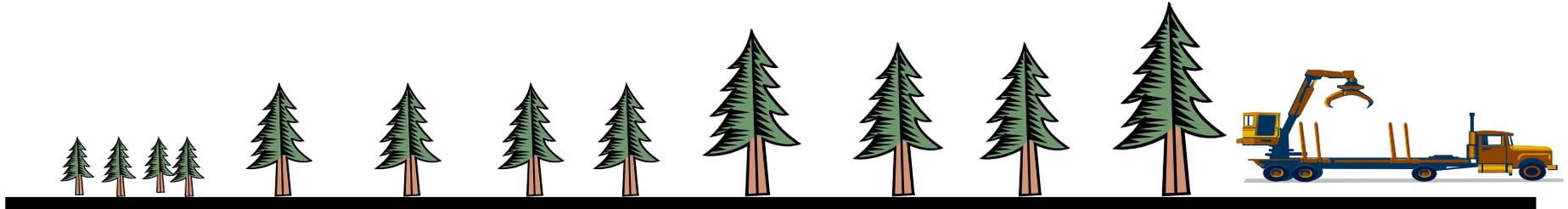


Managing Forests in Georgia





Planted Southern Pine Production



Yr 0.....thin at 15 yrs.....thin at 23 yrs.....harvest at Yr 35

227 US tons/ ac total
517 tonnes/ha total
14.7 tonnes/ha/yr

Sources: SiMS stand simulator growth and yield model; Bentley, James; Harvest and Utilization Study, 2004; Southern Research Station, USFS; **Loblolly pine yield (g tons/ac/yr) on old-field Piedmont site with SI=65**



Timber Harvests in Georgia





Timber Harvests in Georgia





Timber Harvests in Georgia





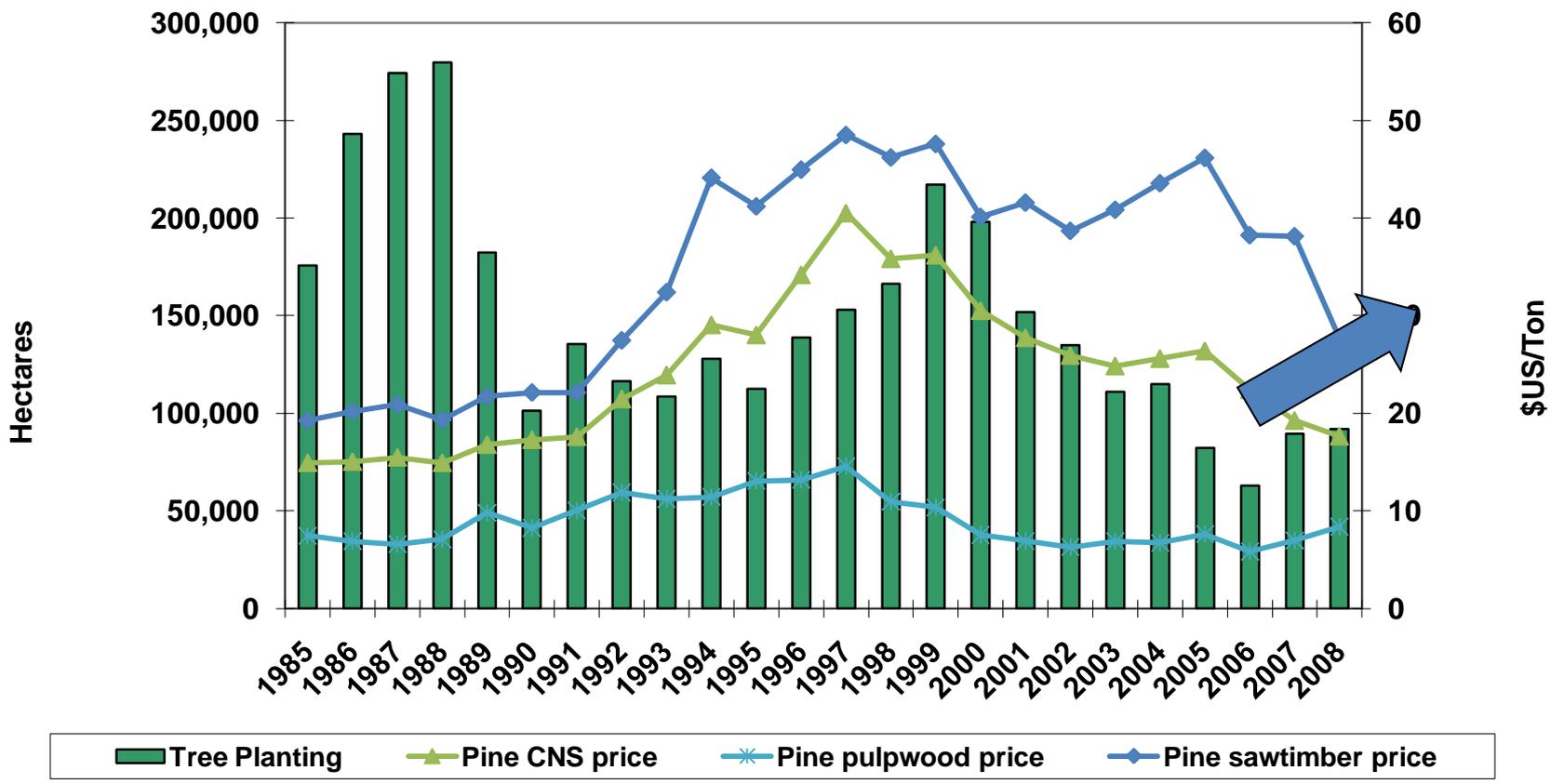
BMP's Protect Environmental Resources





More Business = Better Environment

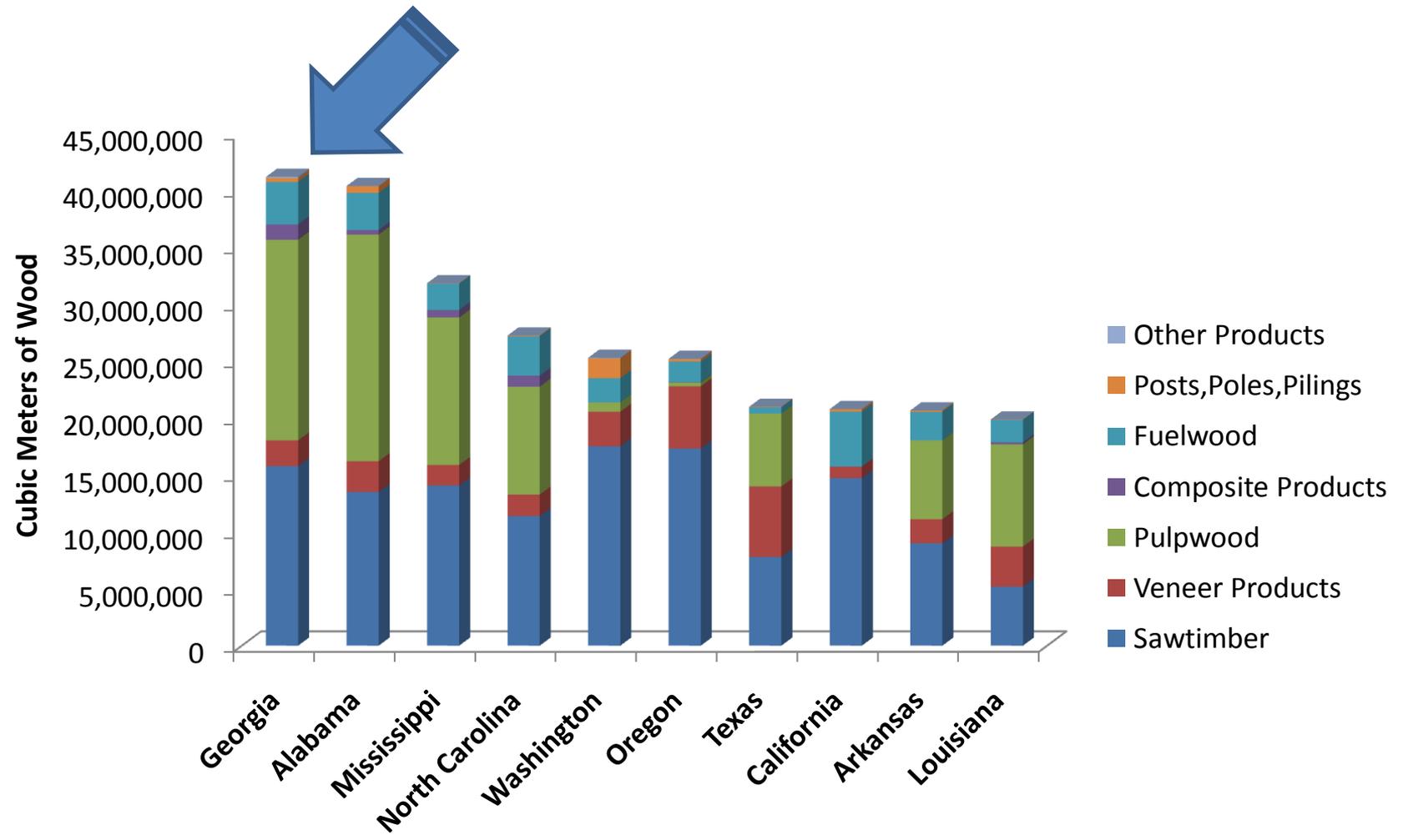
Increase market demand and price for wood resources to a level that is sustainable and results in increased reforestation and forest management.



Source: Timber Mart South and Georgia Forestry Commission

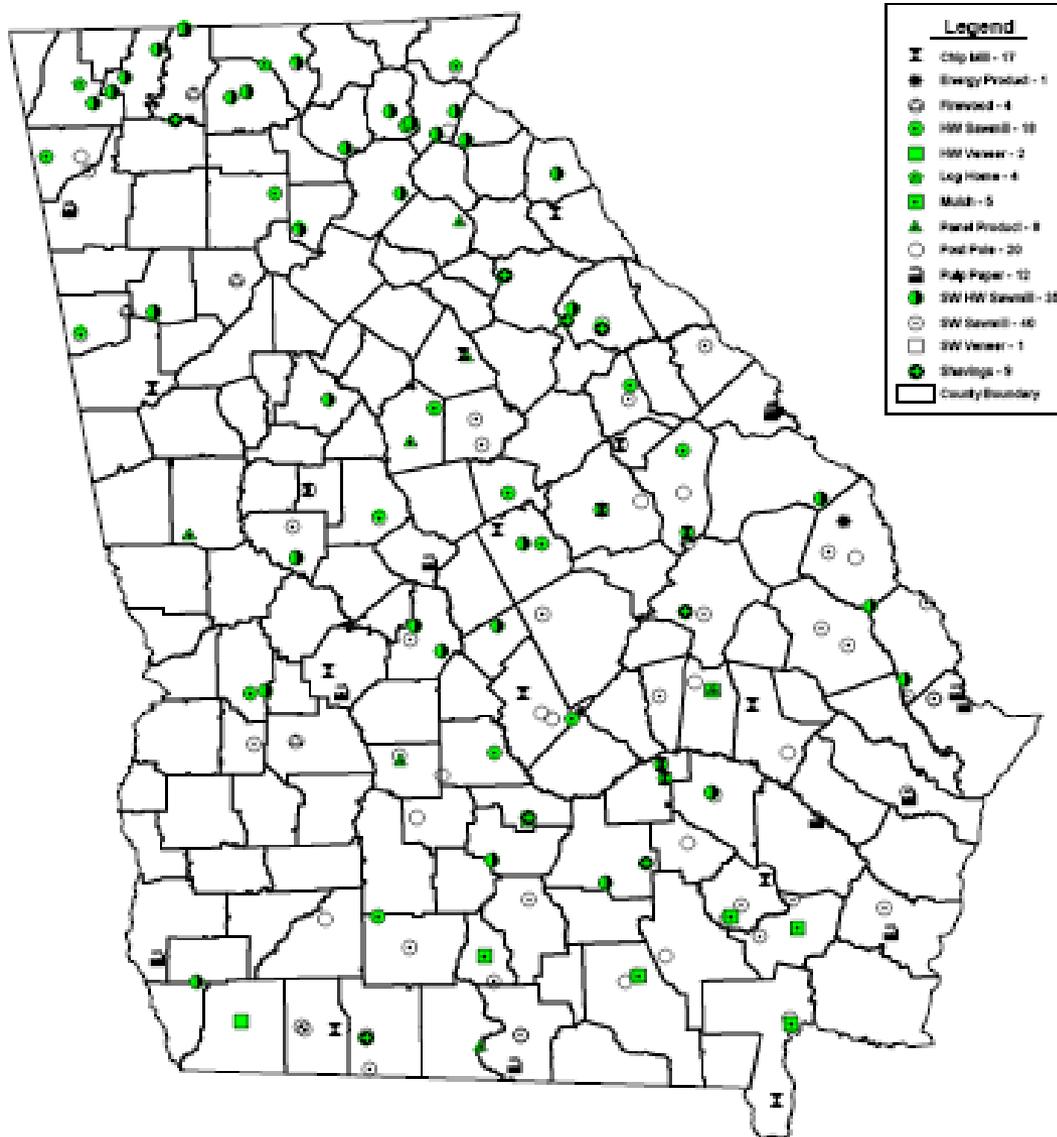


Top 10 US States in Timber Products



Source: Forest Inventory and Analysis , Southern Research Station, US Forest Service, Timber Product Output database

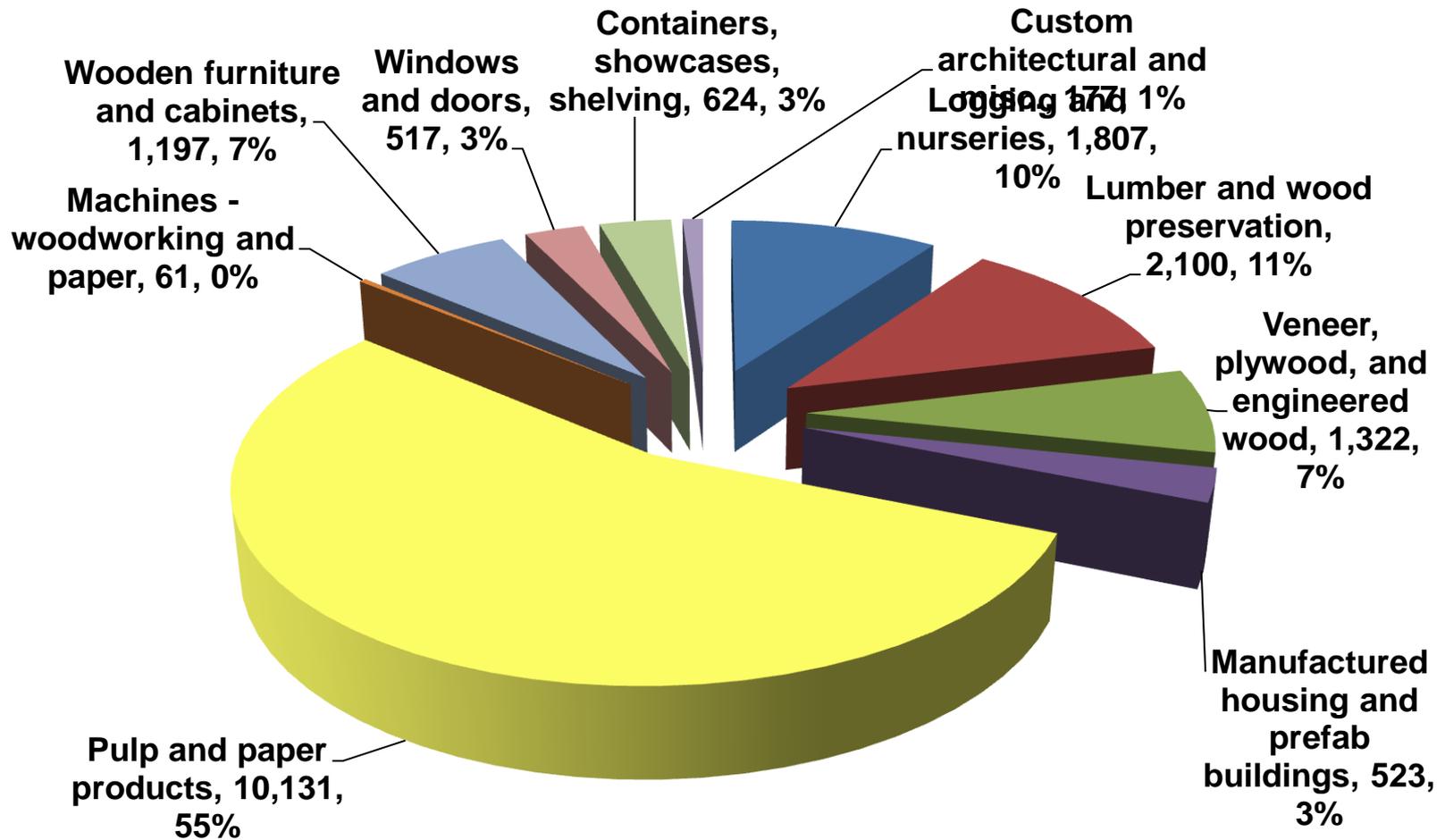
Background – Forest Industry Coverage



90 sawmills
50 misc. mills
12 pulp & paper mills



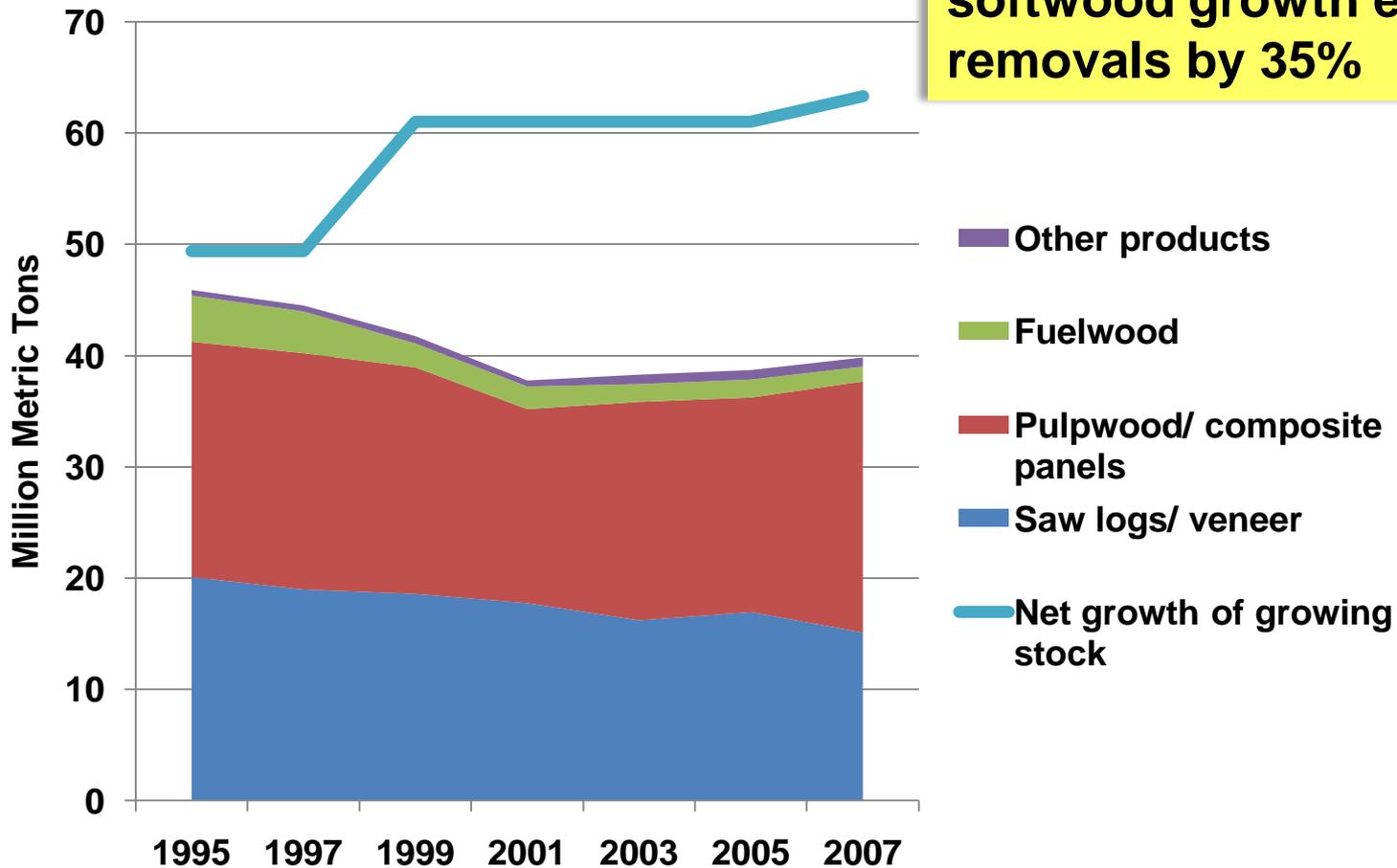
Economic Impact – Output by Sector (million US \$)





Merchantable Wood Growth and Utilization Rates for Georgia

1997 – 2008 Average annual softwood growth exceeded removals by 35%

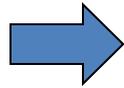


Source: Forest Inventory and Analysis program and Timber Product Output Reports, Southern Research Station, US Forest Service, 1995-2008 Volume -to-weight conversion using 70 lbs/cubic foot



How do we do it?

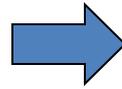
- **Tops and branches of “merchantable” trees**



Logging residues

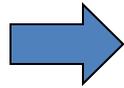


- **“Non-merchantable trees” that are not crop trees**



Remove during harvest, or 2 pass system, or pre-commercial thin, or fuel reduction thin

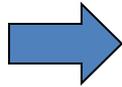
- **“Merchantable” trees**



Small diameter trees

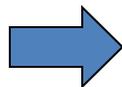


- **Mill residues**



Bioenergy will compete in alternative product markets

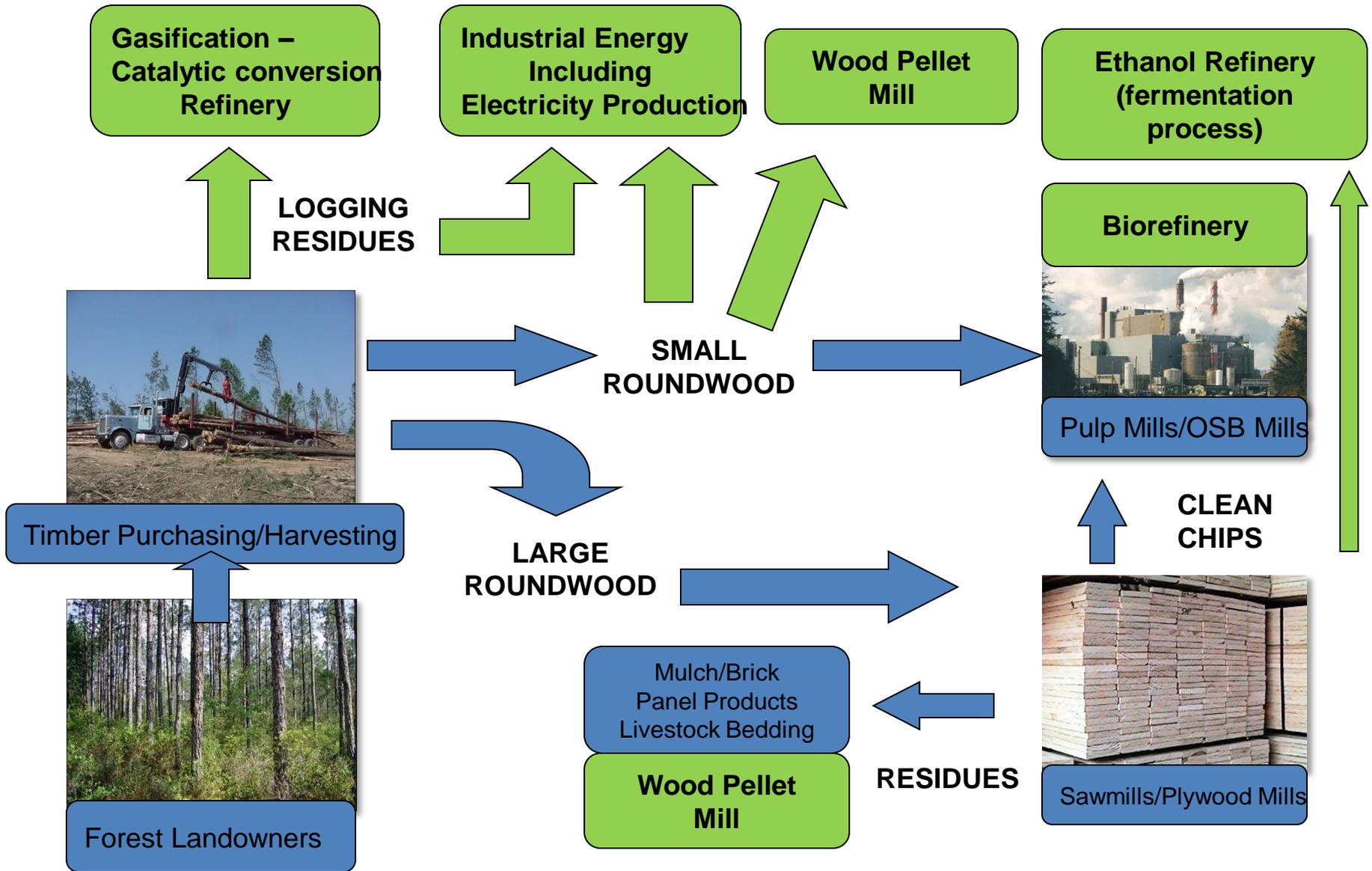
- **Urban wood waste**



Most economical- must consider quality



Forest Bioenergy Logistics Graphic





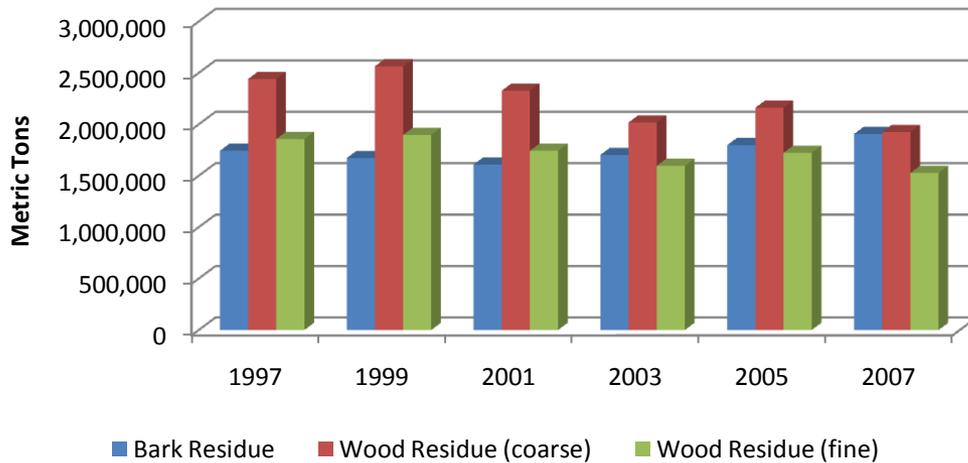
GA Un-utilized Forest Biomass (2009 estimates using oven dry US tons)

Resource		Amount (odt)	Recovery	Amount to Recover (odt)	Additive Amount
"Non-merchantable" biomass inventory in forests	Recovery during regeneration harvests	163,300,000	1.4%	2,286,200	2,286,200
"Non-merchantable" biomass inventory in forests	Recovery during thinnings	163,300,000	1.0%	1,633,000	3,919,200
Biomass from "pre-commercial" thinning of natural forest stands of pine and pine/hardwood		46,388,654	1.0%	463,887	4,383,087
Logging residues produced annually in forest management operations (excluding stumps)	Total	3,667,170		0	4,383,087
	From growing stock	1,940,250	100%	1,940,250	6,323,337
	From non-growing stock (included in non-merchantable biomass)	1,726,920	0%	0	6,323,337
Other annual timber removals resulting from land-use change	Estimate 75% recovery	1,834,625	75%	1,375,969	7,699,305
Mill residues produced annually		7,305,000	0%	0	7,699,305
Recoverable urban wood waste annually		1,436,823	100%	1,436,823	9,136,128
Additional annual timber growth	1998-2007 average	9,556,522	100%	9,556,522	18,692,650



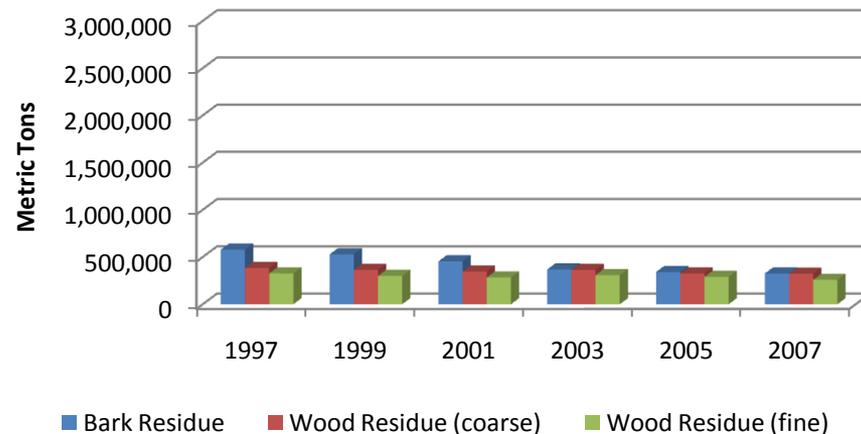
Mill Residues

Softwood (pine)



Pine bark: 2 mil mt
Pine chips: 2 mil mt
Pine sawdust: 1.5 mil mt

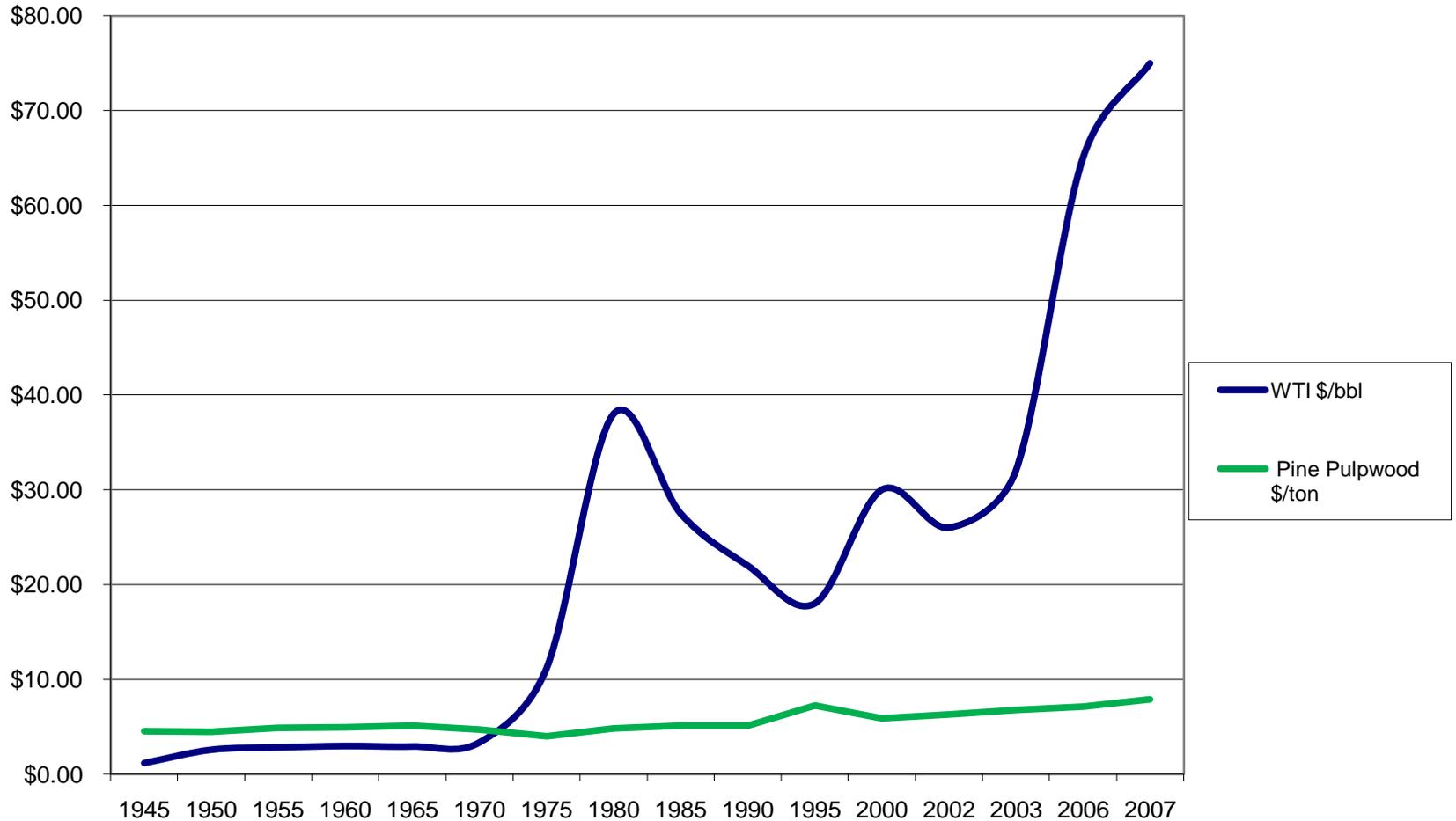
Hardwood



Source: Forest Inventory and Analysis program, Timber Product Output Data, Southern Research Station, US Forest Service,



SE Avg Pulpwood Stumpage vs. West Texas Intermediate Crude Oil Prices



Source: Timber Mart South, Dartnell, GFC



UGA Harvest Study (Baker, Greene, and Westbrook)

- Cleaner sites
- Neater appearance
- Lower fuel loads
- Reduced site prep costs (~\$25/acre)
- Less area in piles (1-2% less)

Tops & Limbs

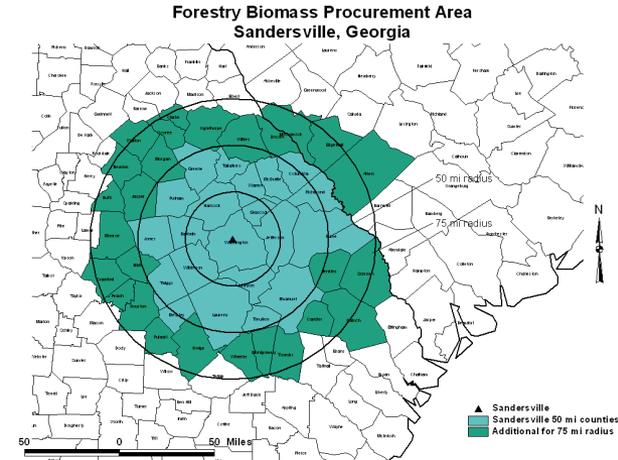


Tops, Limbs & Understory



Industry Support

- GFC Resource Assessments and forest management assistance
- UGA Resource Sustainability Studies
- UGA Biomass Harvesting Studies
- Energy Innovation Center
- GT and UGA business development and technology research
- Economic Development organizations





Summary

Georgia has a viable forest resource and industry infrastructure to support new bioenergy industries.

Nathan McClure; nmcclure@gfc.state.ga.us; 1-478-951-4548