RESOURCES *for the* FUTURE

# Working Forests: A path to climate solutions

David N. Wear

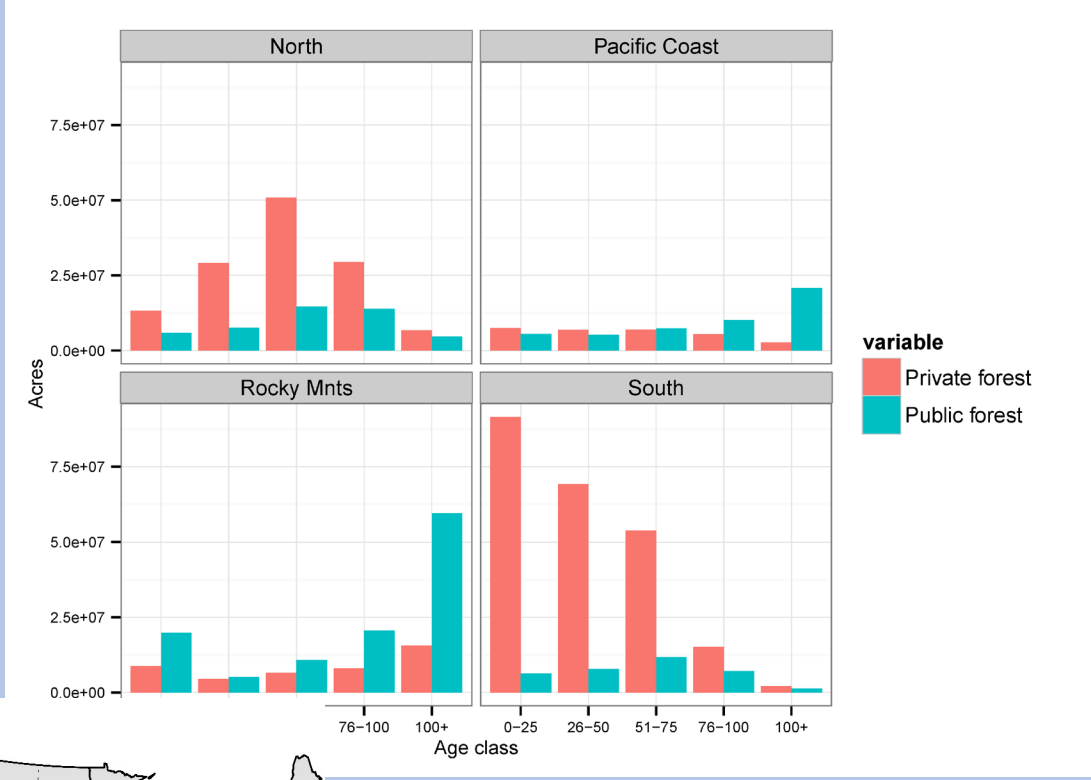
Nonresident Senior Fellow

**May 4, 2022**

# Considering the joint provision of carbon benefits and sustainable wood products…

- Working forests:
  - Private forests that are actively managed to provide desired outcomes (timber, carbon, recreation…)
- Carbon sink:
  - The flow of atmospheric carbon (CO2) sequestered in solid form (C)
- Carbon stocks:
  - The amount of stored C at any given time
- Stock change = sink:
  - Changes in stocks are used to infer the magnitude of the sink

# The ownership, age, and structure of forests varies across US regions…

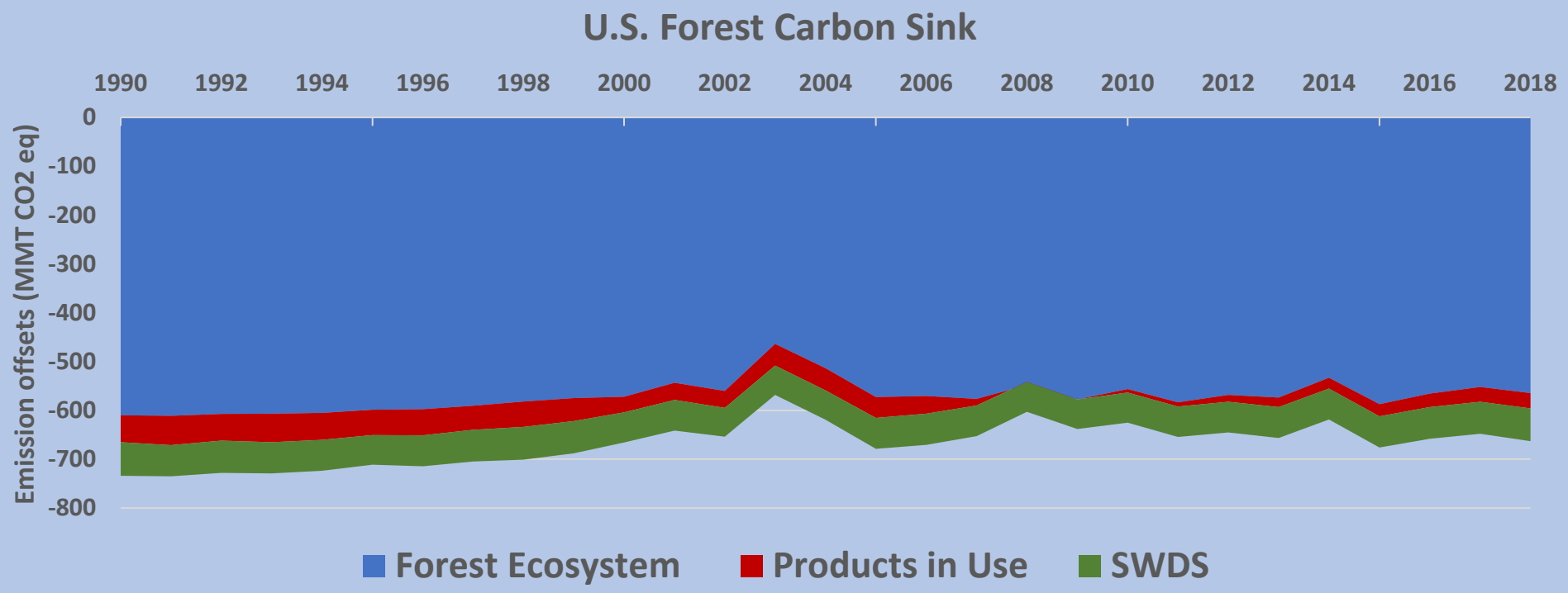




- Public forests dominate in the west
  - Older forests overall
- Private forests dominate in the East
  - Younger forests overall
  - South's age distribution indicates more management/harvesting
- Policy proposals need to account for vast differences in forests

Source: US Forest Service, FIA forest inventory databases.

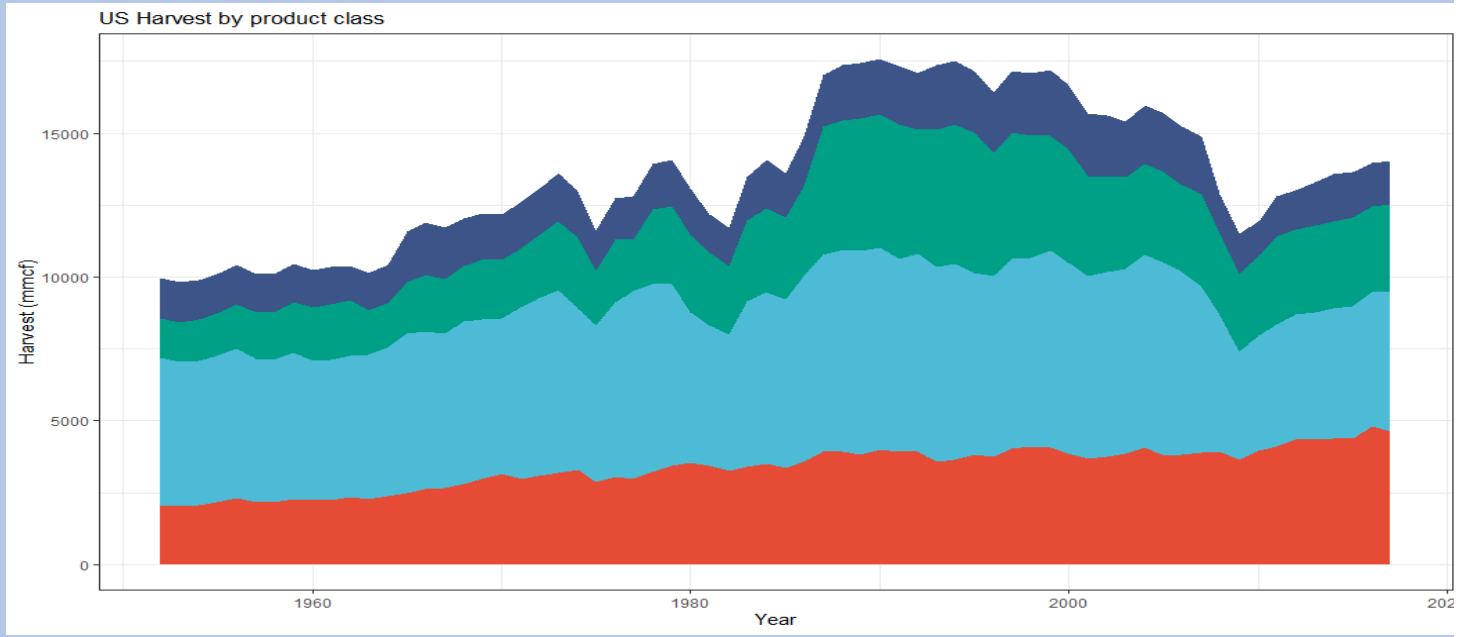
# The U.S. forest carbon sink is dynamic, substantial, and consequential…

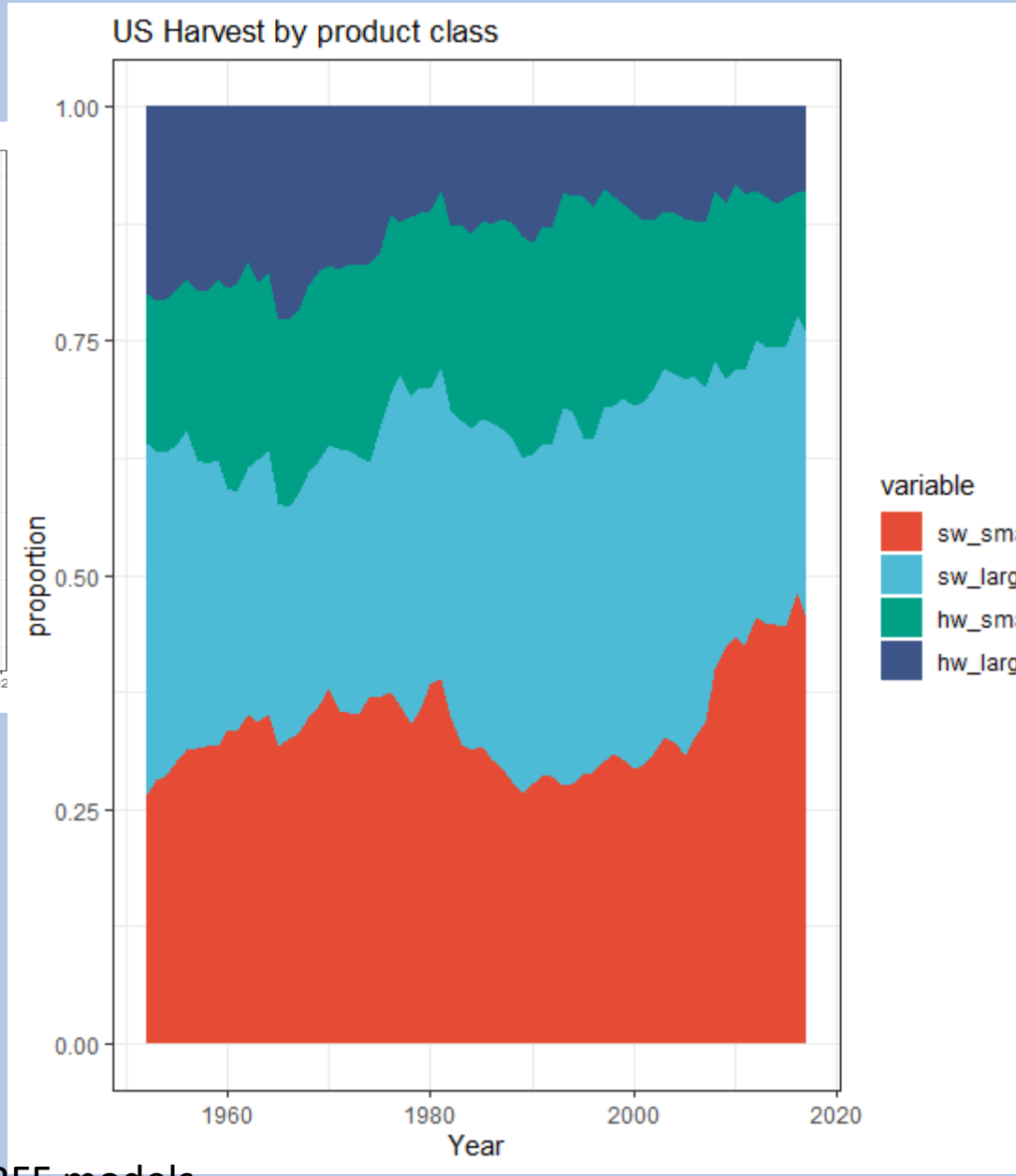



- Consequential? Land and forest carbon sinks amount to about 12 percent of total US emissions.
- Dynamic? Robust with a gradual decline in size of sink (-13% since 1990)—wood products becoming a large share of total.

Source: US EPA Greenhouse Gas Inventory, based on USFS FIA inventories and FPL models

# At the same time, the U.S. consumes and produces more timber than any other nation…

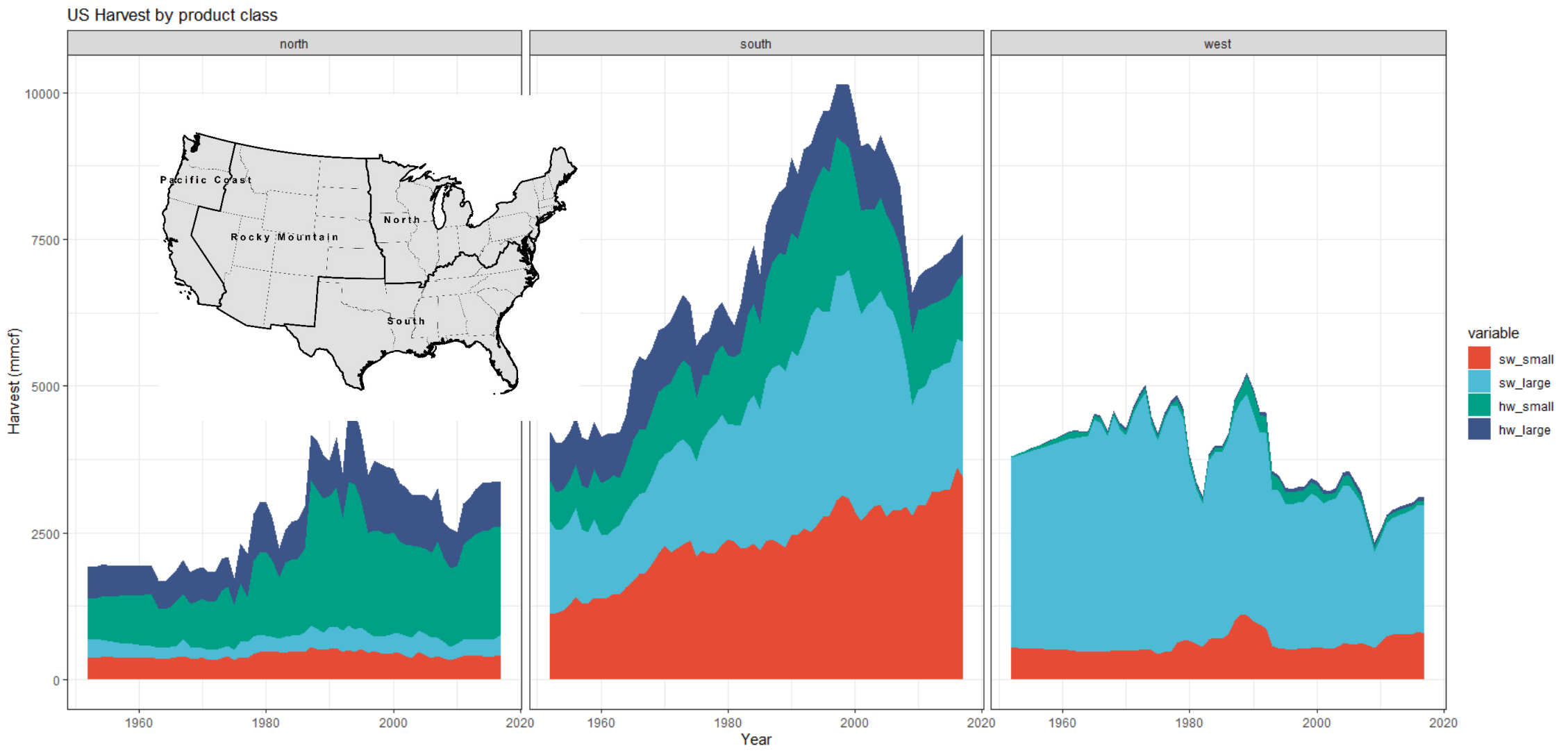



- Peaked in the late 1990s
- Increasingly dominated by softwoods
- Average diameter of harvested trees is declining
- Cyclical component:  housing and construction
- Steady growth in pulpwood sized softwood timber

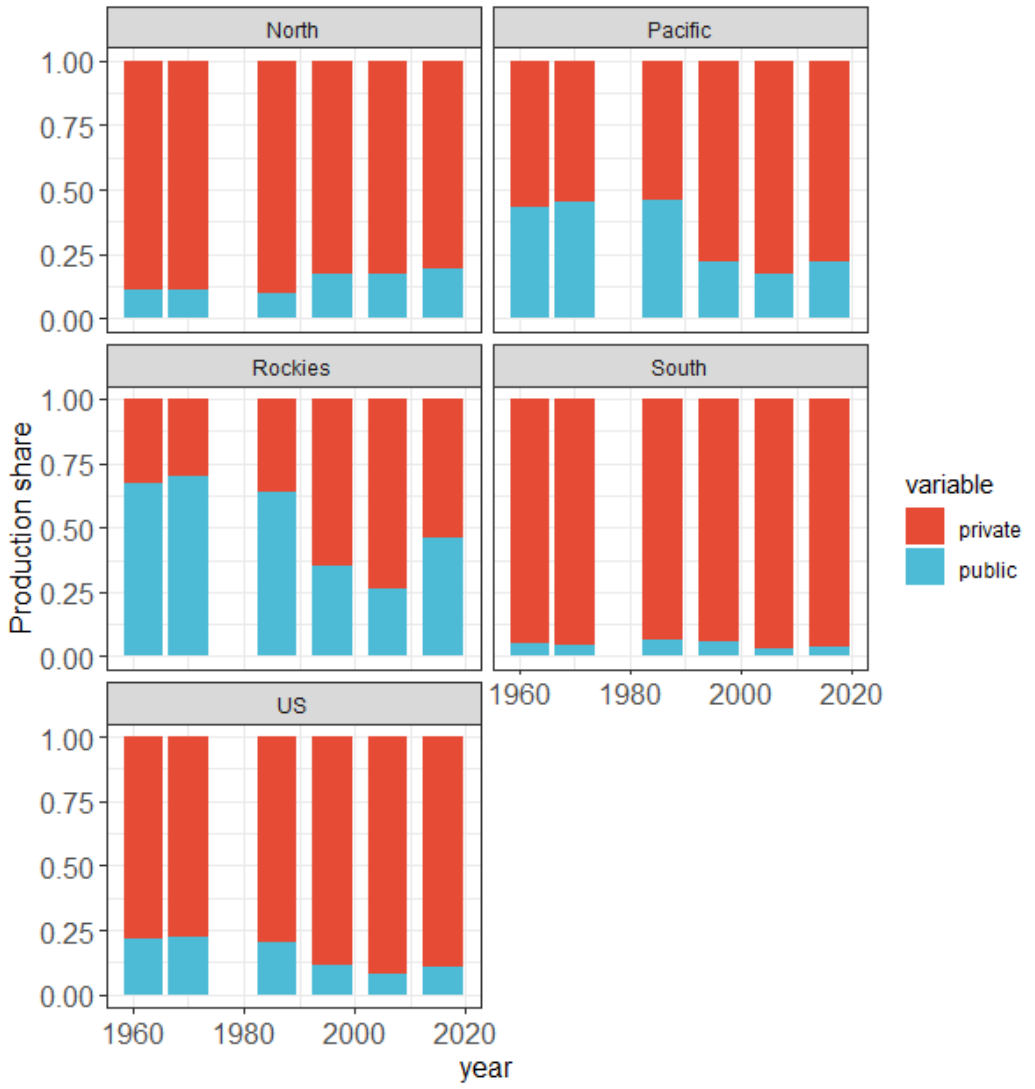
Source: USFS Timber Product Outputs periodic data, interpolated with RFF models

# Harvests have shifted among regions; strongest growth has been in the South…



# Timber production is now dominated by private working forests…

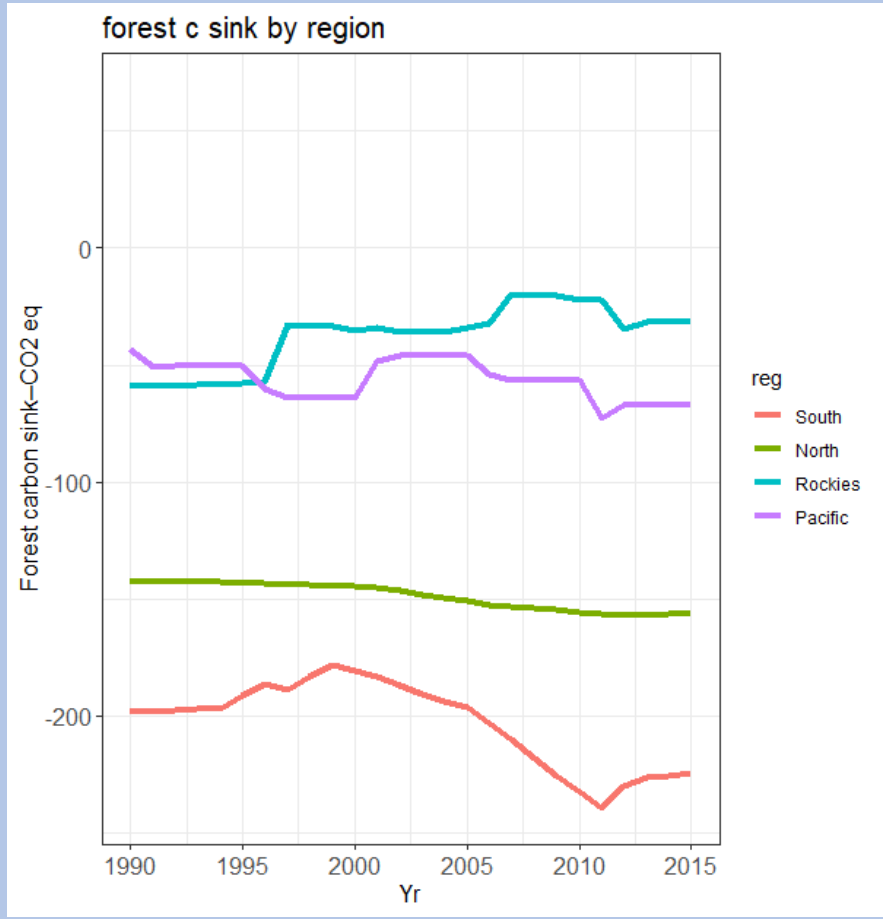
- Large declines in public output and share of production in the early 1990s
- Private forests now produce ~90% of all timber output
- Production in all regions is majority private




Source: FIA data on inventory removals reported in USFS RPA reports

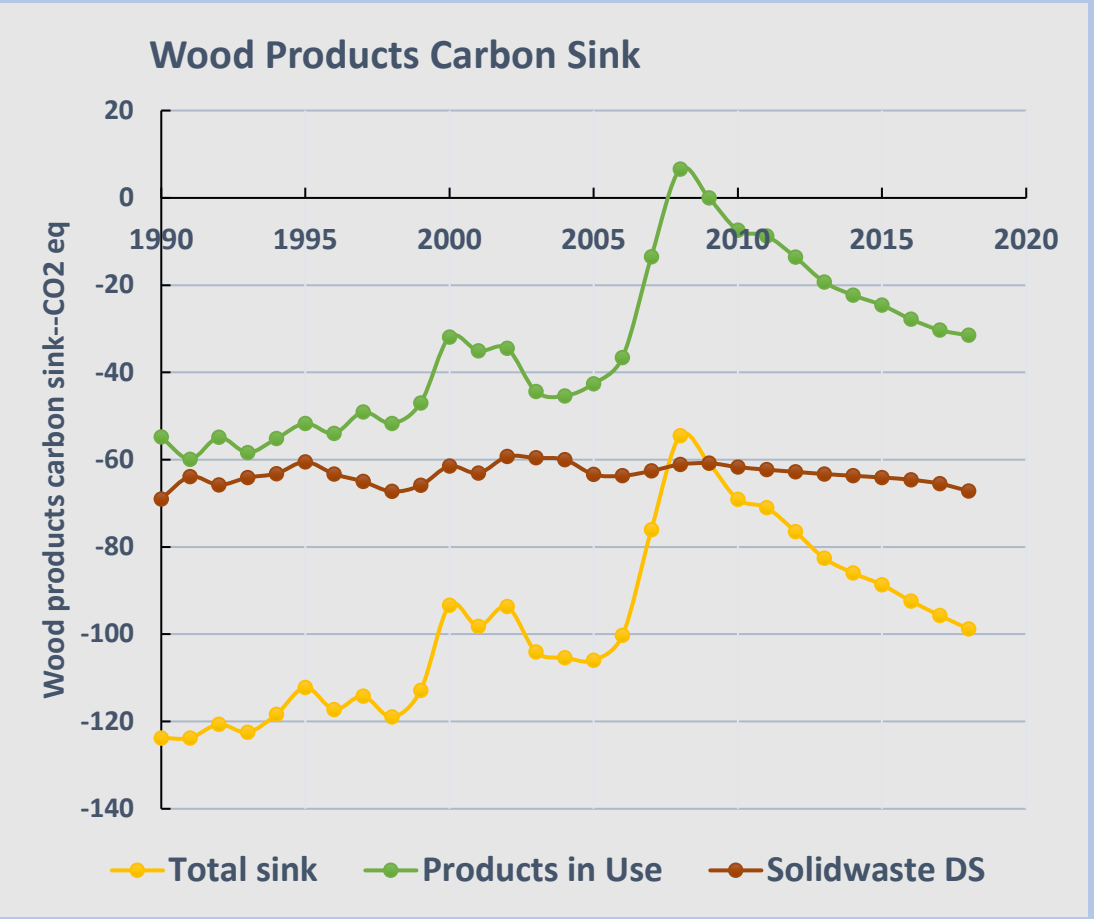
# Regions dominated by private forests also provide most of the US forest carbon sink…

- History demonstrates the joint production potential for carbon and timber
- Sink expansion in the East and especially in the Southeast
  - About 80 percent of the forest C sink is in the East
  - RPA projections indicate this could grow to 90 percent by 2030




Source: USFS RPA Assessment 2015 Update; Woodall et al. 2016

# Wood products carbon stocks are dynamic and strongly linked to economic activity…




- Wood products carbon sink is dynamic
  - Affected by economic growth, housing starts and other demand factors
  - Strongly affected by 2008-2009 Great Recession
- Downward secular trend in wood products carbon sink
  - Declining per capita consumption in wood products

Source: US EPA Greenhouse Gas Inventories, based on USFS FPL models

# The forest carbon sink is a tale of two dynamic carbon stocks…

**Forest ecosystem carbon stock**

- Credits
  - Growth (Photosynthesis)
  - Management to increase growth
  - Reforestation/Afforestation
- Debits
  - Disturbance (fire, wind,…)
  - Harvesting
  - Deforestation

**Wood products carbon stock**

- Credits
  - Utilization/New construction
  - Design to increase wood content
- Debits
  - Deconstruction
  - Decay

Stock=units * carbon density

# How can the carbon sink be expanded in this market-driven private forest landscape?

1

### Incentivize forest ecosystem carbon

- Payments for enhancing forest carbon stocks
- Encouraging growth in the average C-density of forests

2

### Incentivize wood use

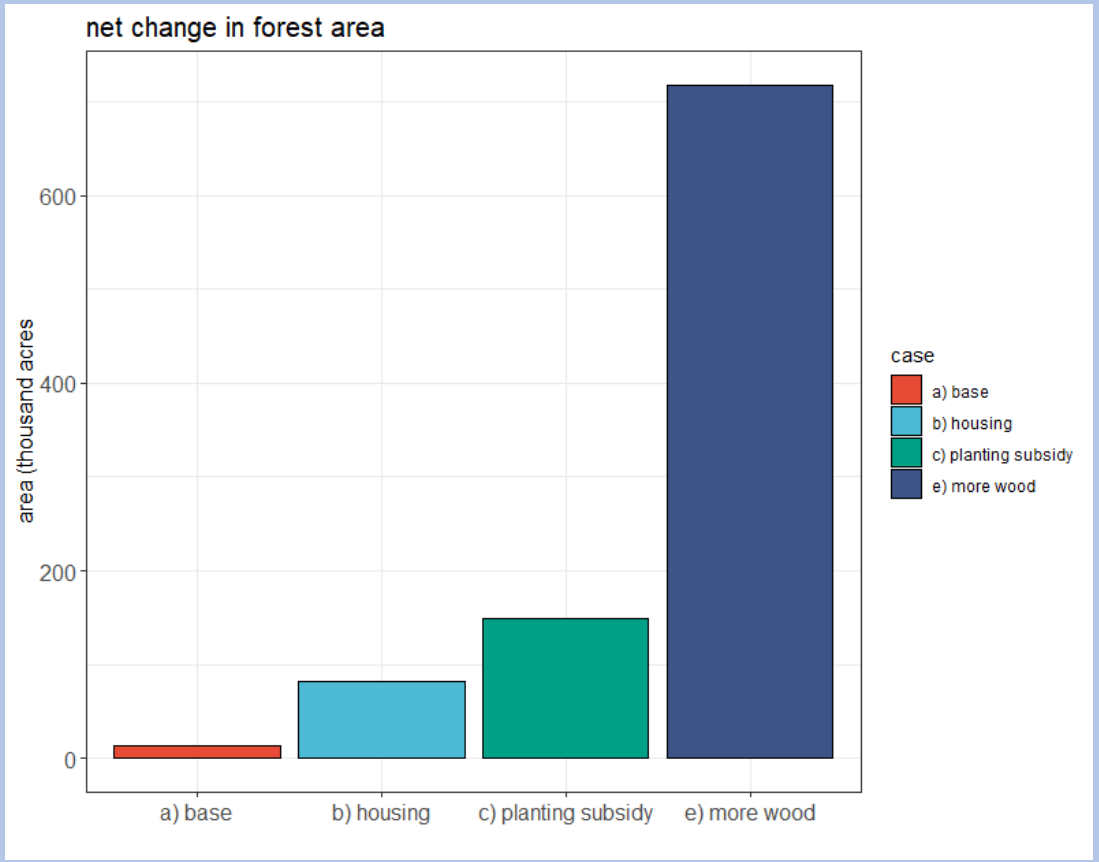
- Payments for decreasing carbon footprint of construction (including substitution effects)
- Encouraging growth in the C-sink of new buildings

3

### Incentivize land use change

- Increased forest returns (1 and 2) to encourage afforestation
- Discourage deforestation for development

# Wood products markets interact with land use decisions in the South…




- More housing construction:
  - Encourages tree planting
  - But forest gains are offset by forest urbanization
- Tree planting subsidies (50%)
  - Small net gains due to market feedbacks
- Increased wood content (20%)
  - Strongest afforestation effect
- Strong evidence that price incentives "work"

Source: RFF research on wood products markets and forest land use decisions (in process)

# Expanding the role of working forests in climate solutions

- Wood product uses have expanded the forest carbon sink
  - Growth in product stocks
  - Substitution effects
  - Forests reset to rapid accumulation phase
- Policies that increase returns to forest uses have multiple effects
  - More afforestation
  - Less deforestation
  - More carbon sequestration
- Demand side policy is likely more effective than supply side
  - D-Building codes
  - D-Tax treatments
  - S-planting subsidies

# Extent of knowledge is improving rapidly but some gaps exist…

- Need to improve precision of wood products carbon estimates…
  - Updated modeling is needed
  - Standardized estimates of carbon sink contribution of specific wood products
  - Same for substitution effects
  - Extend to regions
  - Links to national carbon stock inventories
- Continued enhancement of critical USFS FIA estimators for forest carbon…
  - National and regional estimators have been foundation for this topic
  - Continued work on small area estimators

RESOURCES *for the* FUTURE

# Thank you.

- Find out more about RFF online: www.rff.org
- Follow us on Twitter: @rff
- Subscribe to receive updates: rff.org/subscribe