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## **Economic Comparison of Woody Biomass Harvesting Strategies in United States**

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# Economic Comparison of Woody Biomass Harvesting Strategies in United States

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## Introduction

Concern over energy security and the greenhouse gases emissions associated with burning fossil fuels has led to increased national interest in bioenergy production. In the United States, adoption of a Renewable Fuel Standard (RFS) requires domestic production of renewable fuels to increase from 14 billion gallons per year (according to the Renewable Fuels Association) to 36 billion gallons per year by 2022.

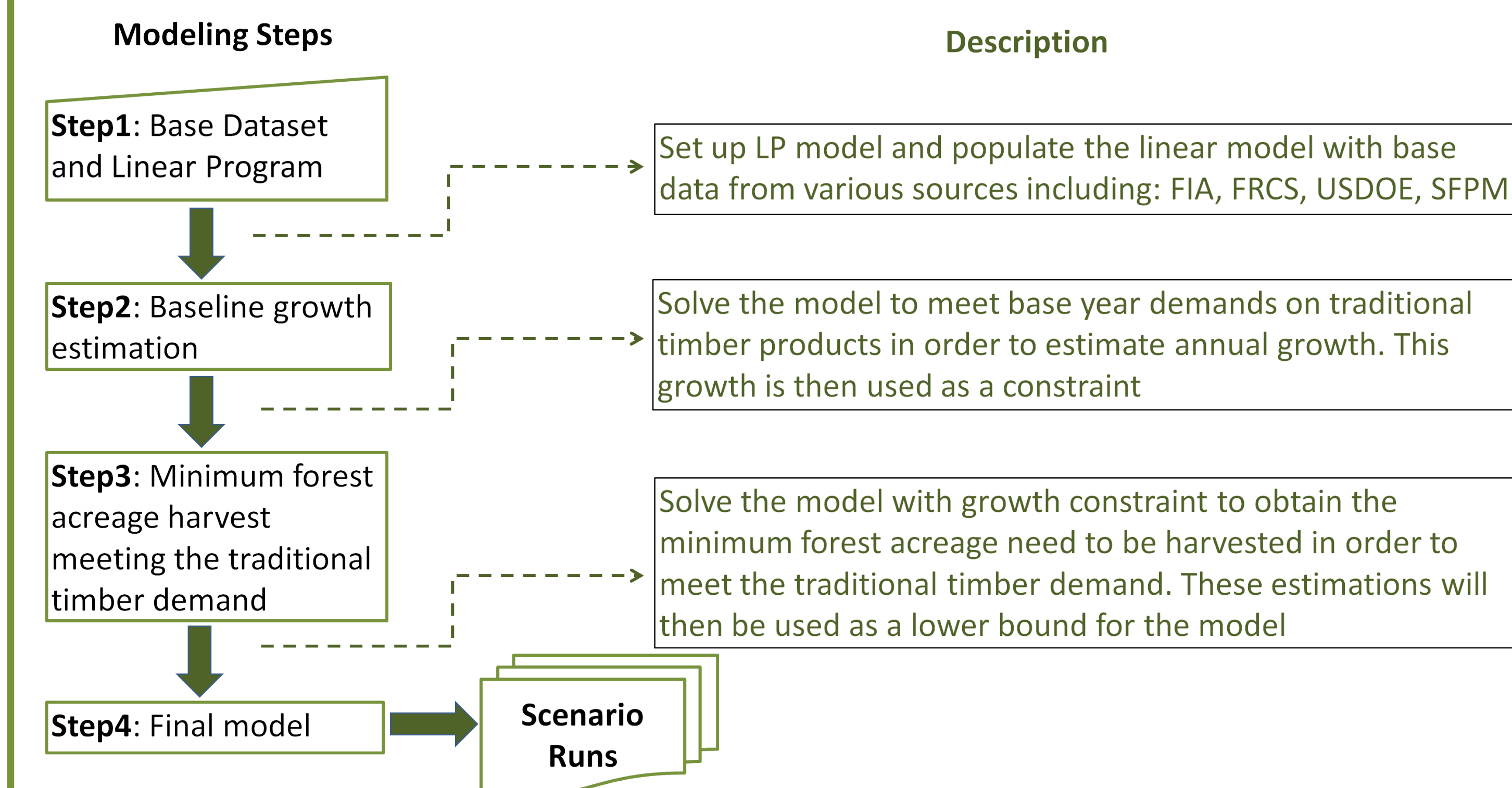
Woody biomass could be a significant component of an RFS portfolio. Woody biomass is collected from logging residue, forest thinning, and small diameter timber. These forest products can be sustainably harvested, and are predictable and reliable in terms of production. Woody biomass has potential to become a primary bioenergy feedstock for heat and co-fire power plants as well as cellulosic-derived biofuels.

The **QUESTION** remains how much and what kind of woody biomass can be sustainability supplied, where is this likely to occur, and at what price will woody biomass products be available?

## Woody Biomass Supply Model

A linear mathematical programming model was developed to determine the mix of conventional timber products and woody biomass as energy feedstock, given traditional wood and wood for energy demand targets, standing wood acreage, and timber growth constraints. Total harvest, chipping, and stumpage costs are minimized, subject to production targets, land suitability, woody biomass and conventional timber growth, timber activity types, stand-size types, topography, and timber product types across 305 regions. Federal lands are assumed not available for biomass supply and traditional needs for wood are assumed to be met before biomass demands can be achieved.

Figure 1: Illustration of modeling steps and description



## Defining Harvest Strategy Scenarios

Scenario	Sources of Harvested Timber Products as Woody Biomass
LoggingResidue	LoggingResidue
ALResidue	LoggingResidue, Non-merchantable timber
HarvPS	LoggingResidue, PS
PreservNS	LoggingResidue, H, PS
HarvAltrees	LoggingResidue, H, NS, PS

## Results

Figure 2: Supply curves of harvesting scenarios

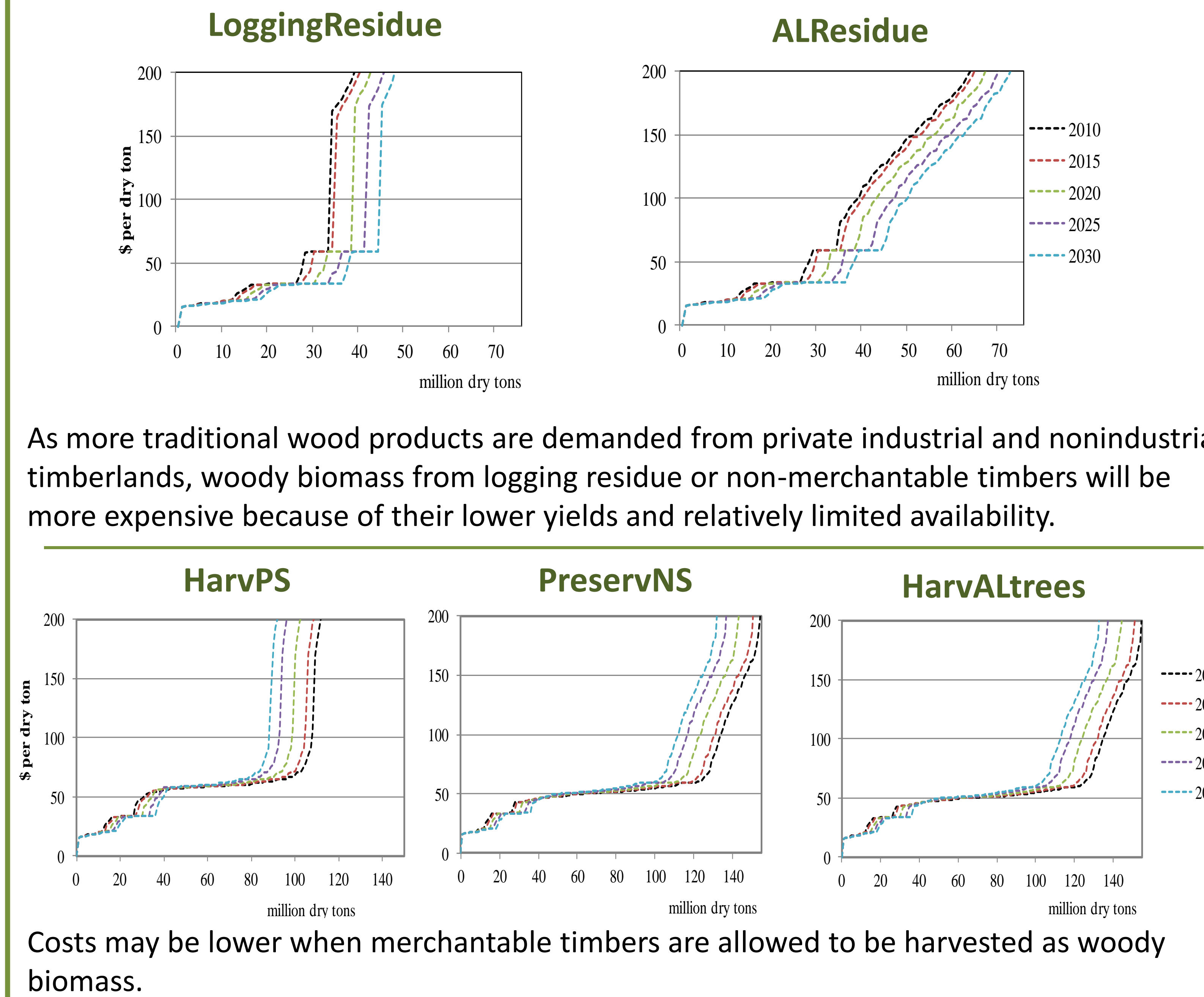
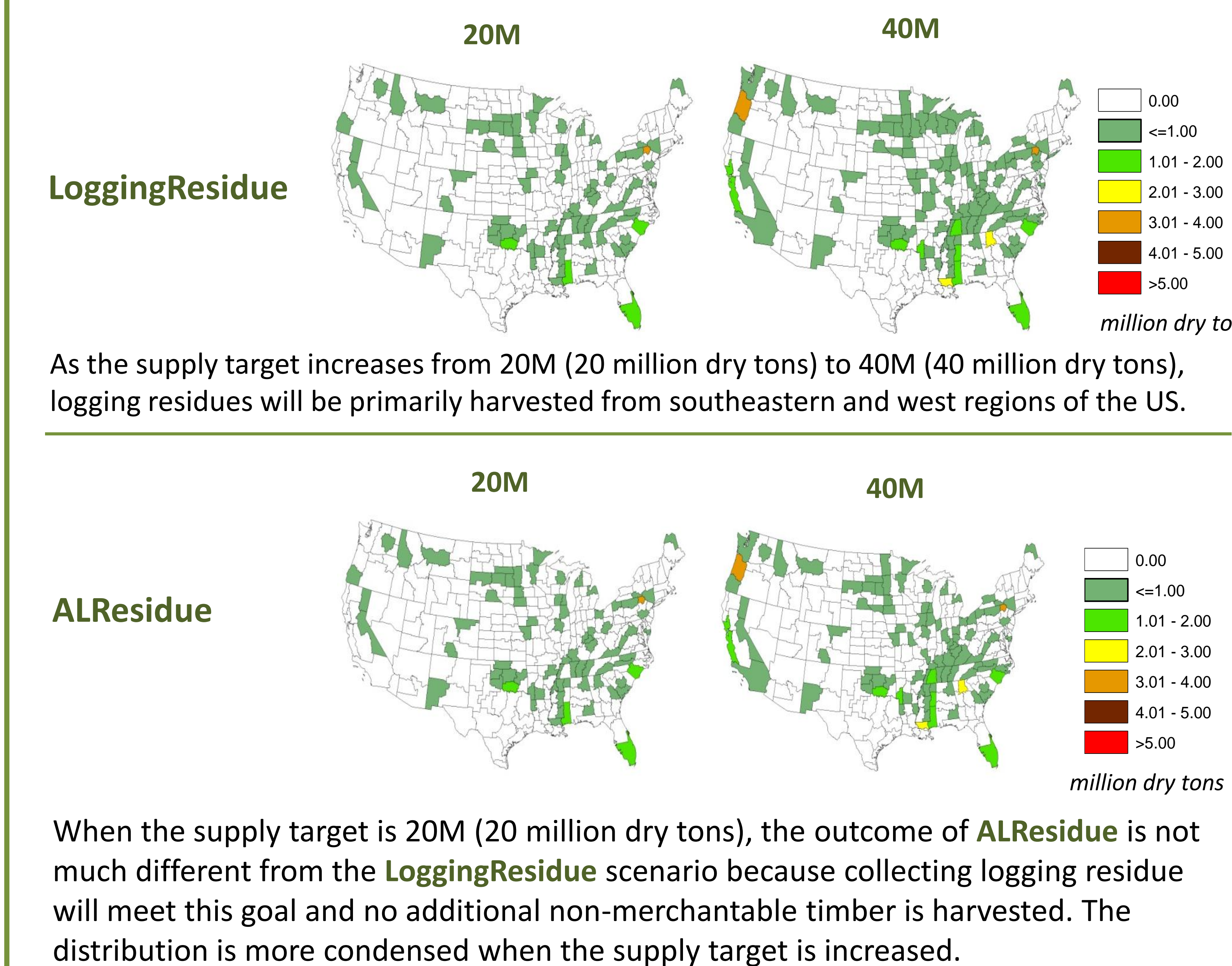


Figure 3: Woody biomass distribution in 2020.



## Results

Figure 4: Harvested hardwood pulpwood volumes for woody biomass in 2020

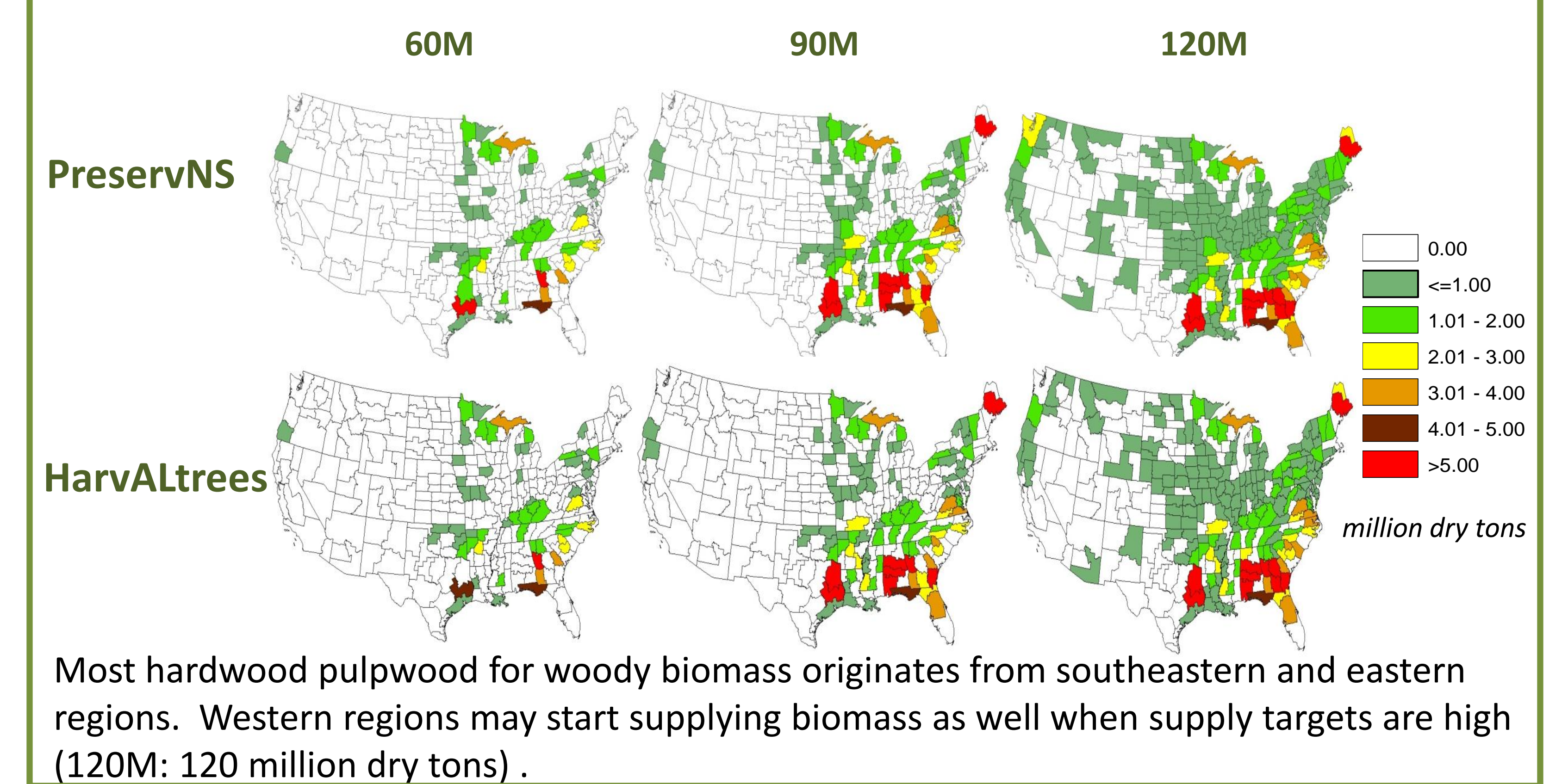
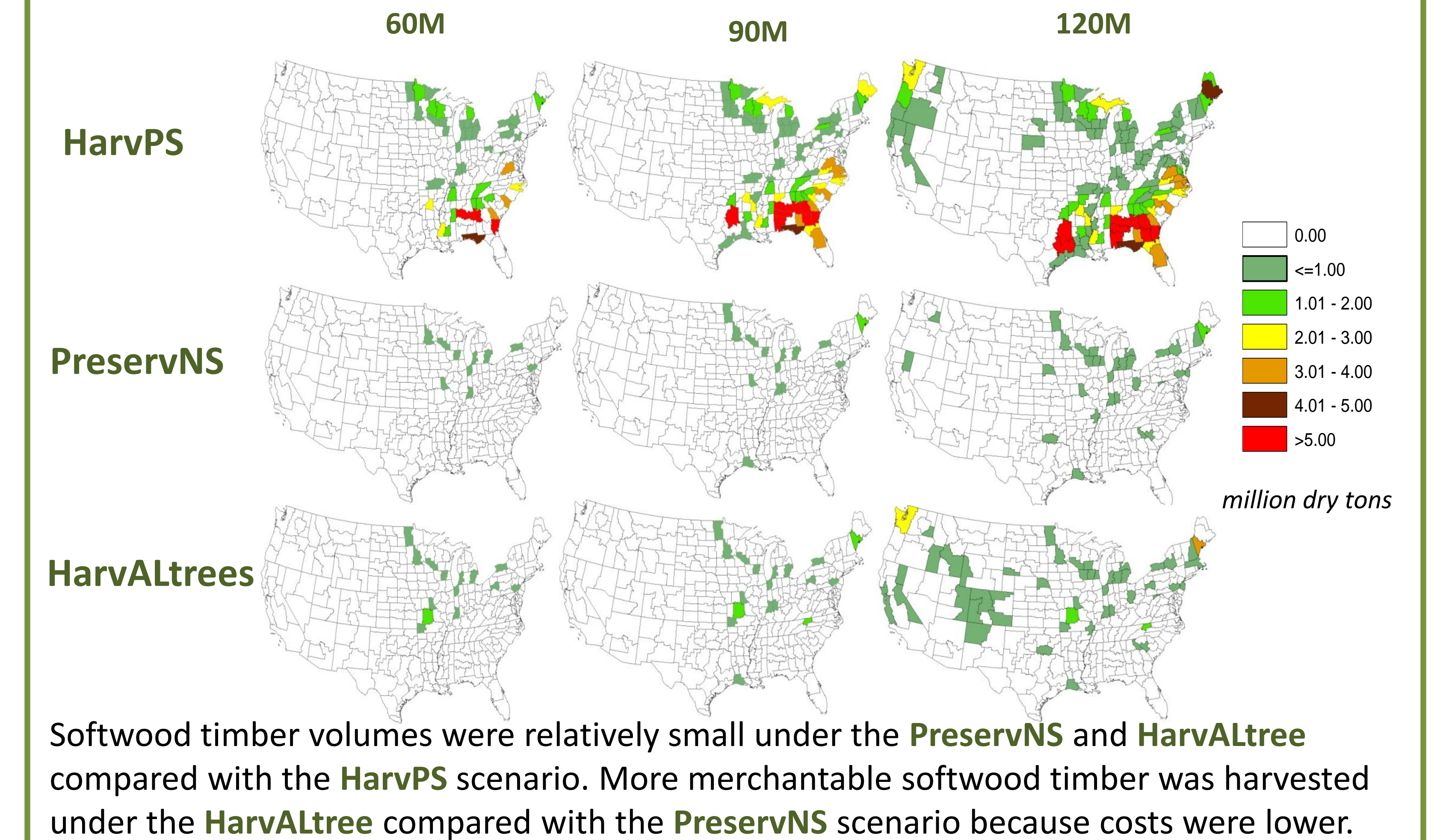


Figure 5: Harvested softwood pulpwood volumes for woody biomass in 2020



## Conclusions

- Forest biomass for energy production is projected to be available over a much wider price range with different timber sources;
- Preserving natural pine or only harvesting planted softwood timber for woody biomass has a relatively small impact on the marginal costs of supply;
- Demand for hardwood and planted softwood biomass from merchantable timber is expected to increase with higher energy production targets;
- Restrictions on the type and size of timber that can be used for biomass will increase the price of biomass.

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