



Modeling the Interaction between Climate and Timber Harvest: A Fully Coupled Approach

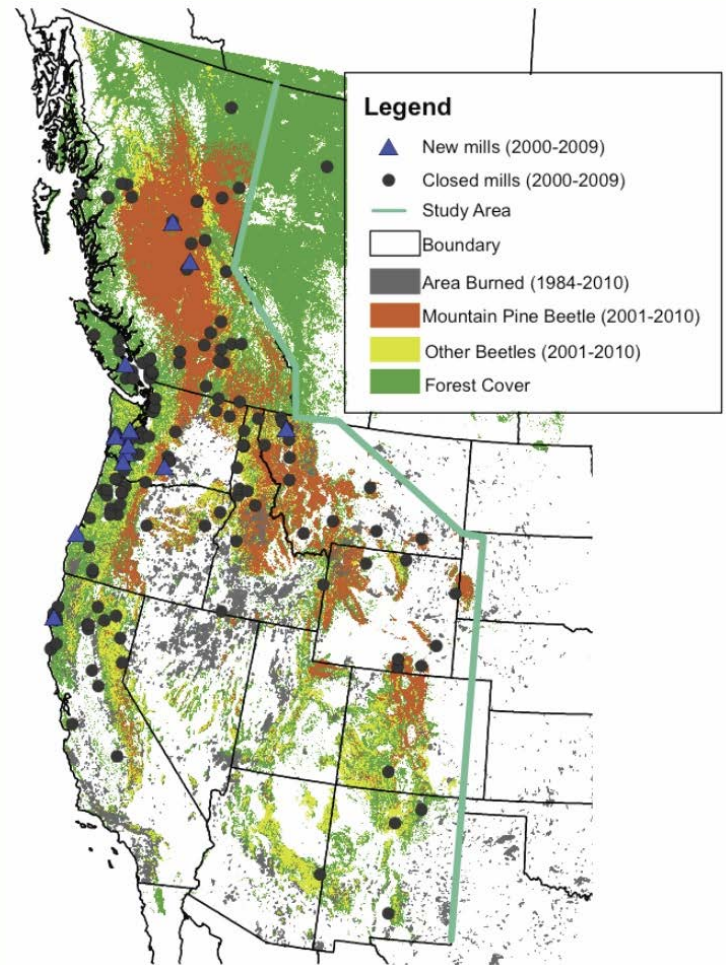
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Introduction

- Forest Mortality, Economics, and Climate (FMEC)
 - Improve CLM's capabilities of modeling land disturbances in the western U.S. (fire, draught, timber harvests, pest infestations)
- Improving wood harvests in CLM
 - Replacing prescribed harvests with flexible harvest algorithm
 - Theoretically founded, yet speedy
 - Models feedback between harvest and climate.

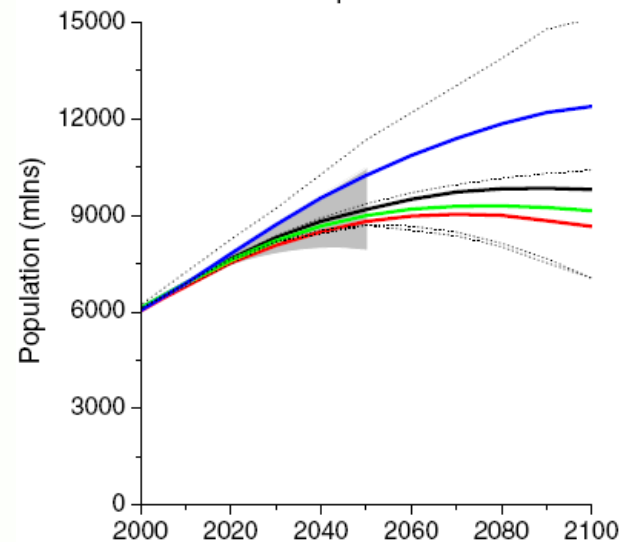
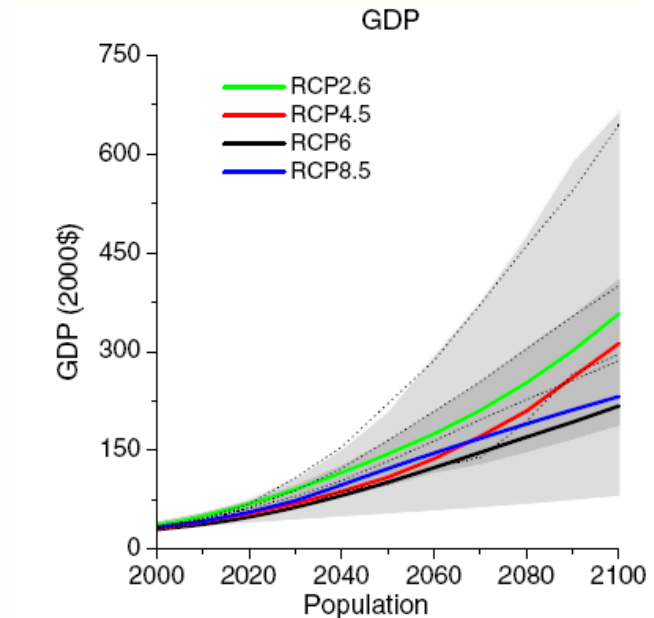


Model Overview

- Pre-Processing
 - Transportation Cost
 - Crow Flies versus transportation network
 - Ownership
 - Economic Parameters and data
- Processing (*4km x 4km res.*)
 - Reads restart file
 - Derives harvest levels and spatial distribution of harvest by calculating a spatial market equilibrium (Supply=Demand).
- Edits restart file/ provides outputs
 - Edits harvest input in restart file
 - Obtains a variety of module specific output

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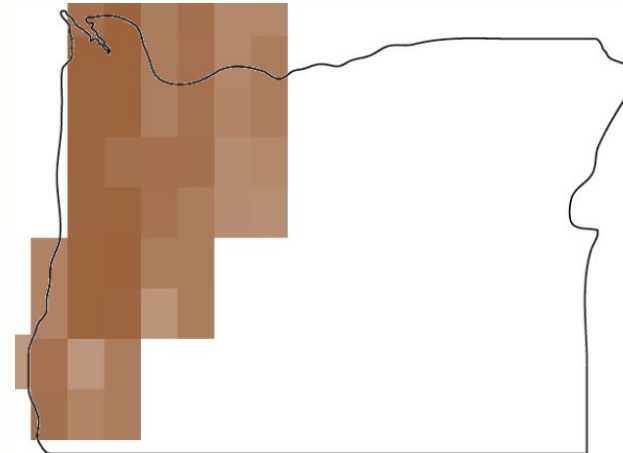
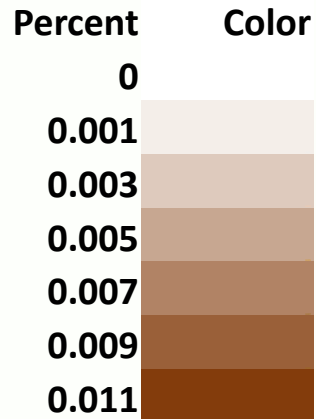
February 21, 2016



(van Vuuren et al. 2011)

Harvest Output

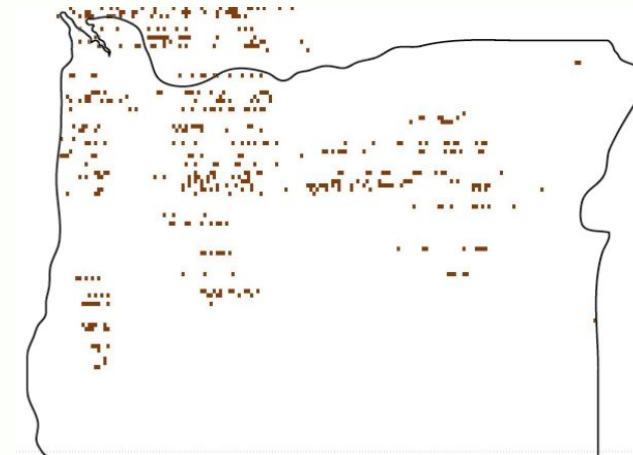
Top: Default Harvest Data
Bottom: Module Generated Data



(Hurtt et al. 2006)

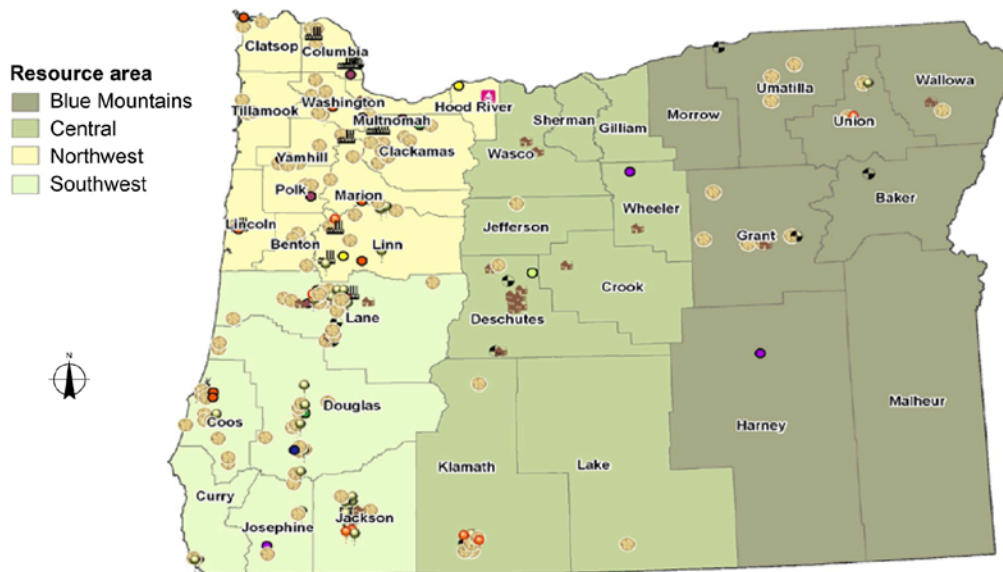
(van Vuuren et al. 2011)

- Target Harvest:
 - 26,339,477 m³
- Module Harvest:
 - 26,986,234 m³



Harvest Output

- Spatial Differences:
 - More harvesting in the east (primarily Ponderosa)
 - Harvesting pattern driven by mill location, transportation costs, and ownership.

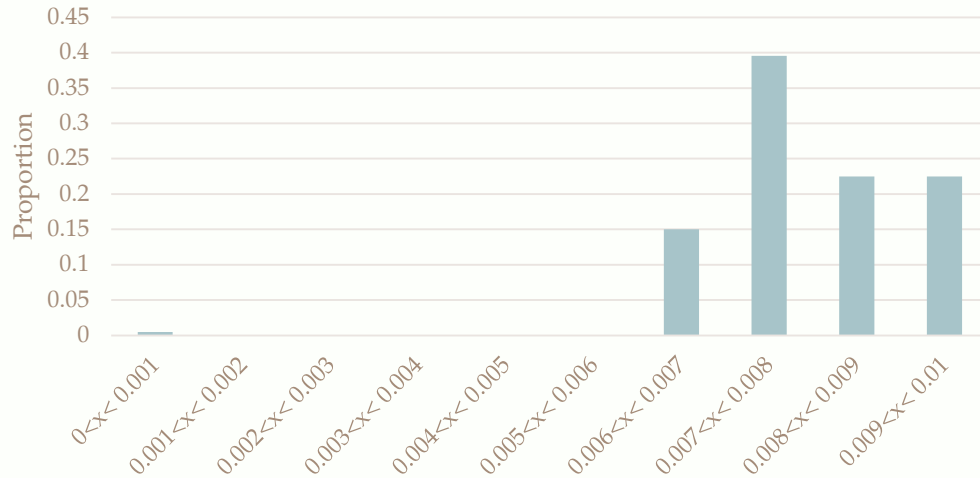


Oregon wood processing facilities, 2008

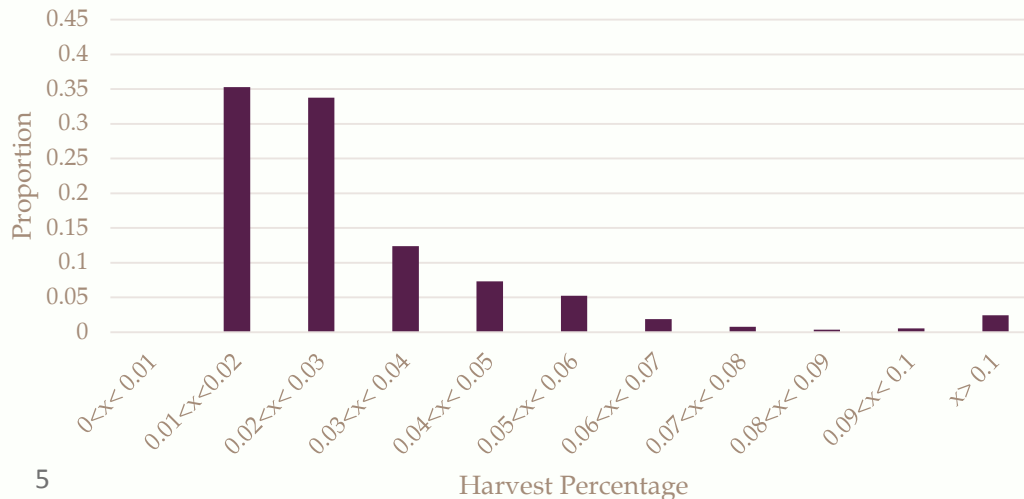
- Bark products
- Biomass/energy
- Cedar products
- Engineered wood products
- Firewood
- Fuel pellets/Presto logs
- House log/log home
- Log furniture
- Other
- Particleboard
- Post & pole
- Pulp/paper
- Roundwood pulp chip conversion
- Sawmill
- Veneer/plywood

(Gate et al. 2012)

Proportion of Harvest Percentages within a given range

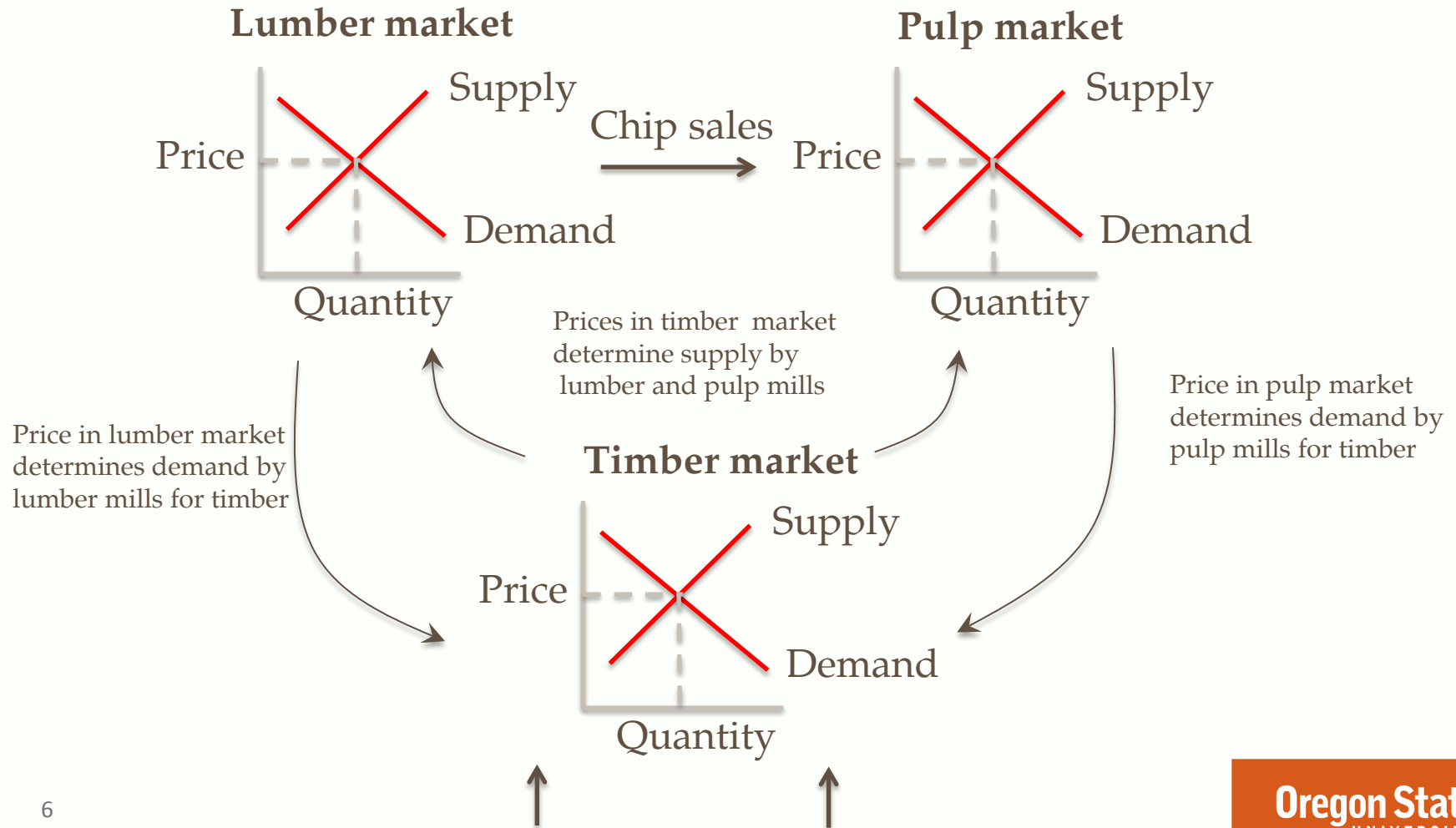


- Default
 - Count: 7680
 - Max: .009
 - Mean: 0.0079



- Module Generated
 - Count: 533
 - Max: ~.96
 - Mean: ~.035

Solution Technique: Overview



Module Output and Future Use

Elgin Lumber Mill in Union County, Oregon



Photo Credit: Gary Halvorson, Oregon State Archives

- Carbon Policy Scenarios
- Economic effects and responses to Beetle Outbreaks and Wildfires
- Changes in land values and productivity

Thank You!

References

- Gale, Charles B., E. Charles III, Erik C. Berg, Jean Daniels, Glenn A. Christensen, Colin B. Sorenson, Todd A. Morgan, and Paul Polzin. "Oregon's forest products industry and timber harvest, 2008: industry trends and impacts of the Great Recession through 2010." (2012).
- Hurtt, G. C., S. Froking, M. G. Fearon, B. Moore, E. Shevliakova, S. Malyshev, S. W. Pacala, and R. A. Houghton. "The underpinnings of land-use history: Three centuries of global gridded land-use transitions, wood-harvest activity, and resulting secondary lands." *Global Change Biology* 12, no. 7 (2006): 1208-1229.
- Van Vuuren, Detlef P., Jae Edmonds, Mikiko Kainuma, Keywan Riahi, Allison Thomson, Kathy Hibbard, George C. Hurtt et al. "The representative concentration pathways: an overview." *Climatic change* 109 (2011): 5-31.