



Critical Market Tipping Points for High-Grade White Oak Inventory Decline in the Central Hardwood Region of the United States

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Overview

Study Context

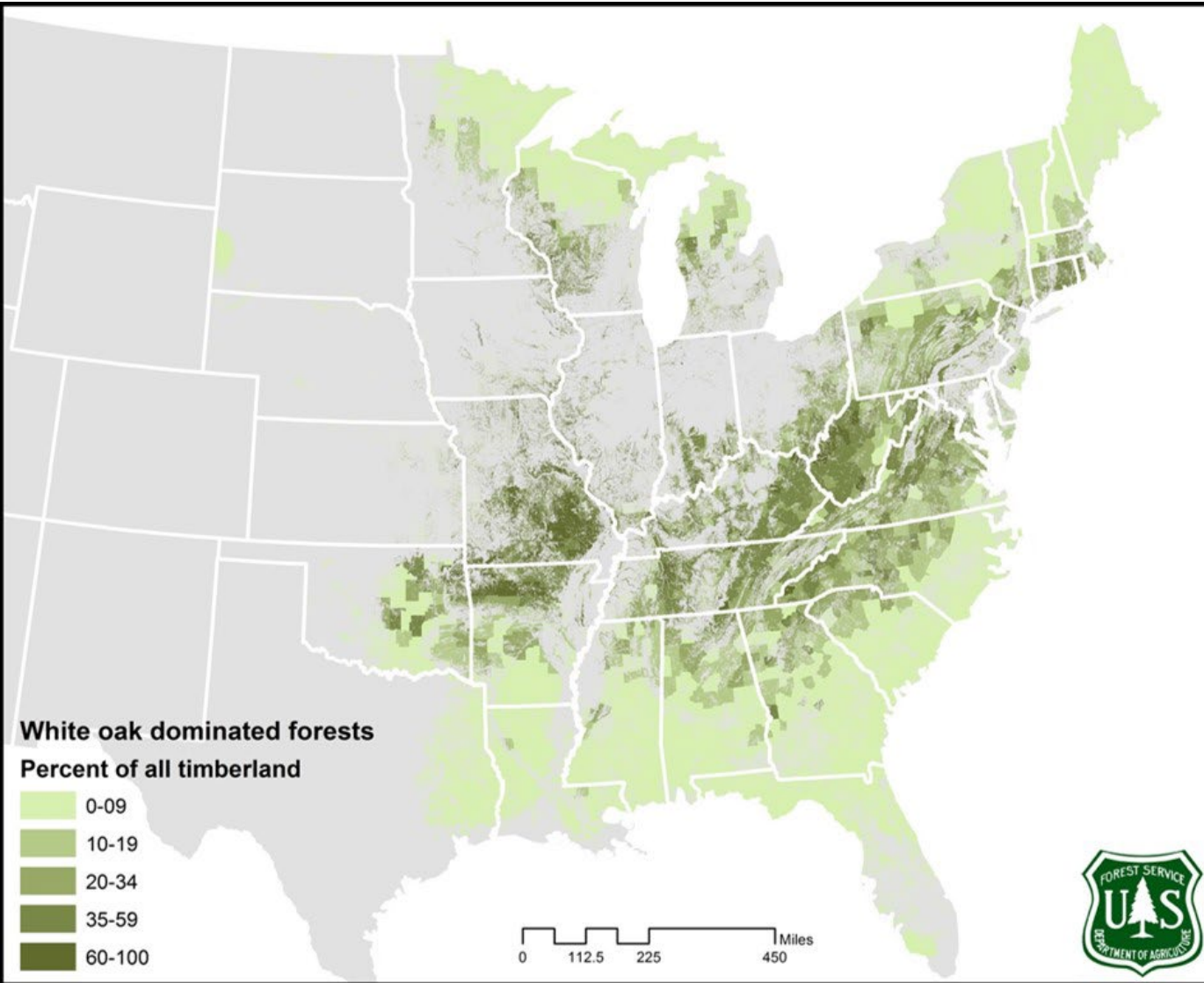
Project Objective

Research Approach

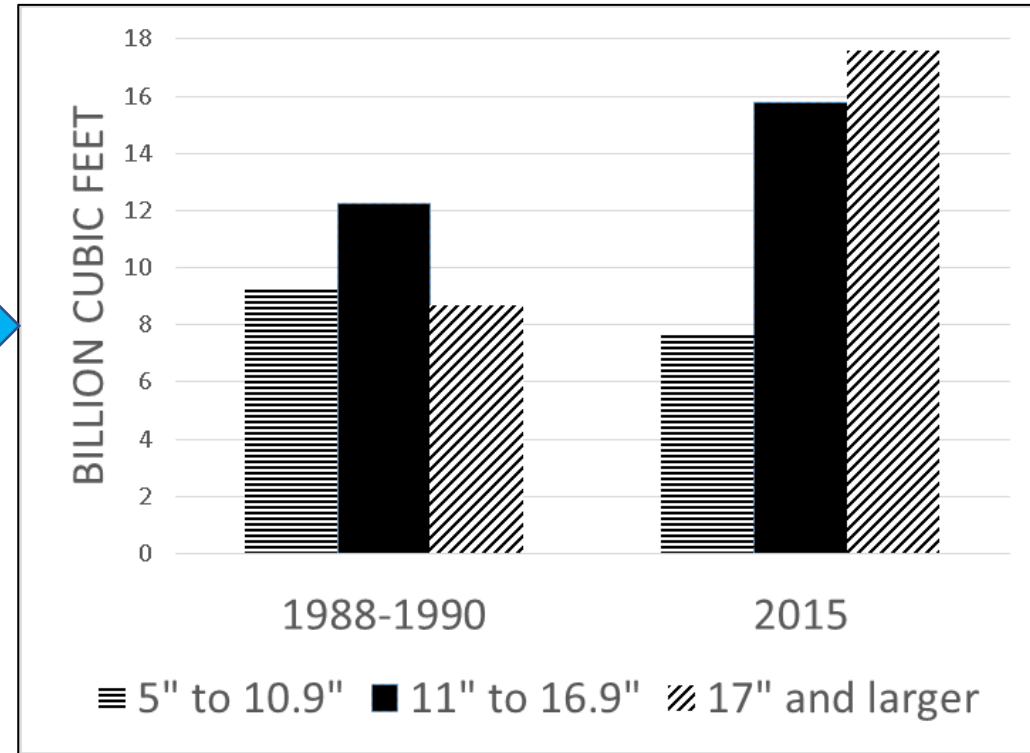
Results

Way Forward

White oak growing region



Inventory levels of white oak



Source: Luppold, 2017 USFS.

Factors influencing changes in hardwood timber base

Ecological factors

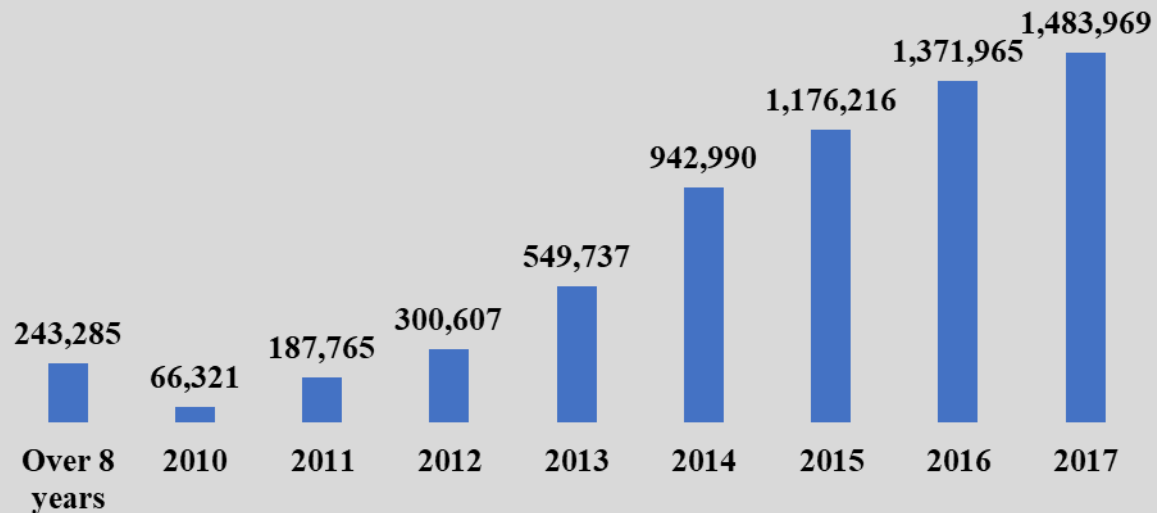
- Mesophication
Fire suppression policies, selective harvesting, herbivore population
- Emerging threats – climate change & pathogens

Socio-economic factors

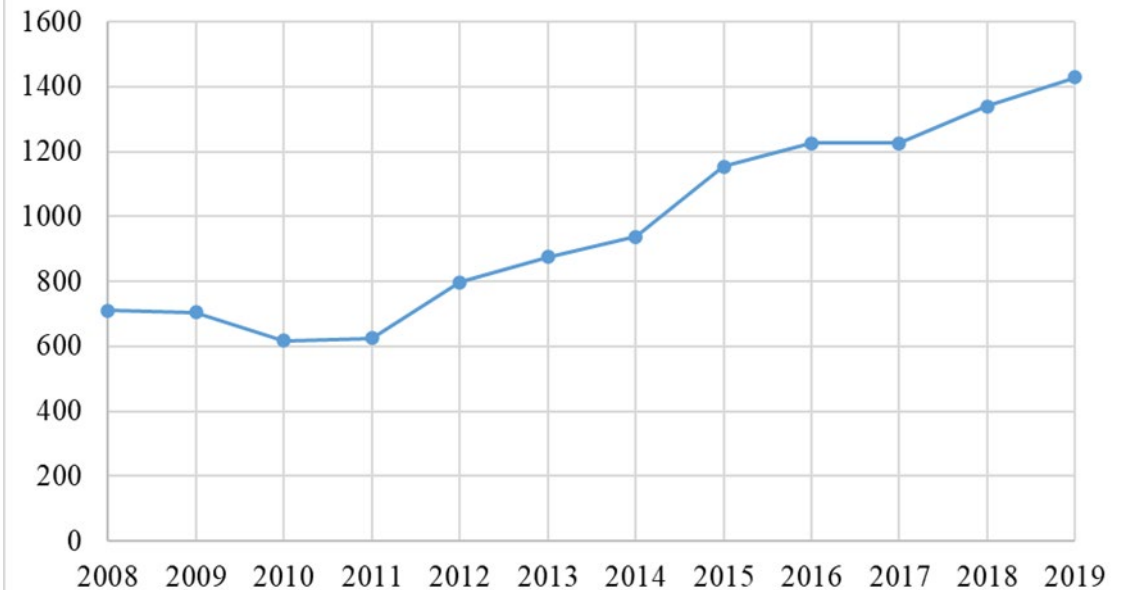
- High-grading
- Lack of active management



Inventory of Bourbon Barrels
(Source: 2019 KDA Report)

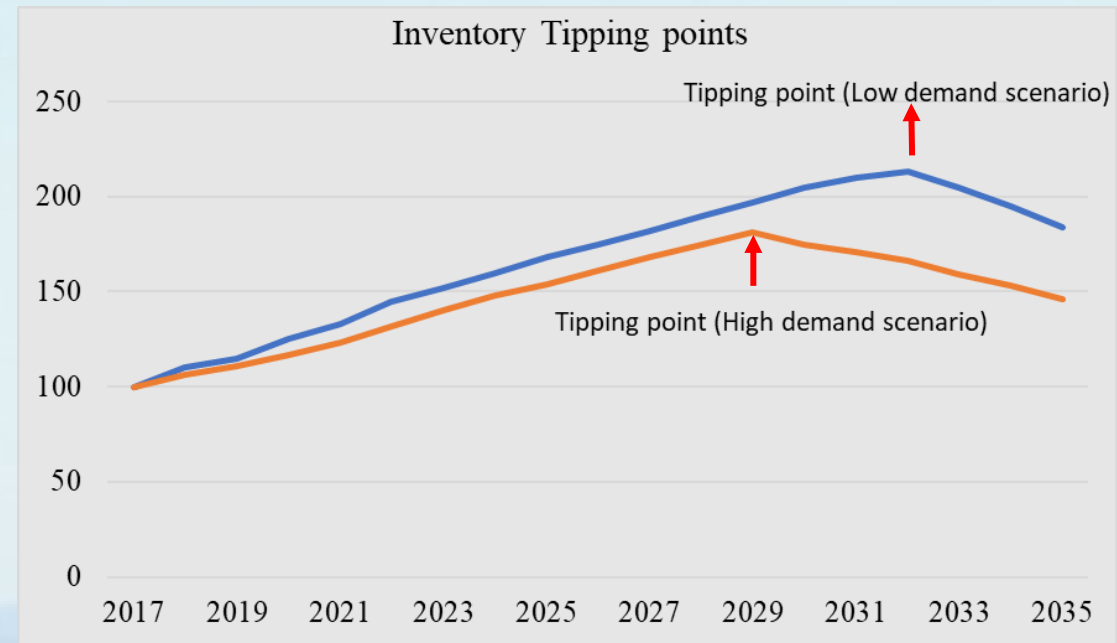


Delivered stave logs prices in Kentucky 2008-2019 by annual average (\$/MBF)



Specific Project Objective

1. To expand the spatial scope of the SRTS model to the Central Hardwood Region to quantify critical market tipping points in time for high-grade white oak inventory



SRTS Modeling Framework

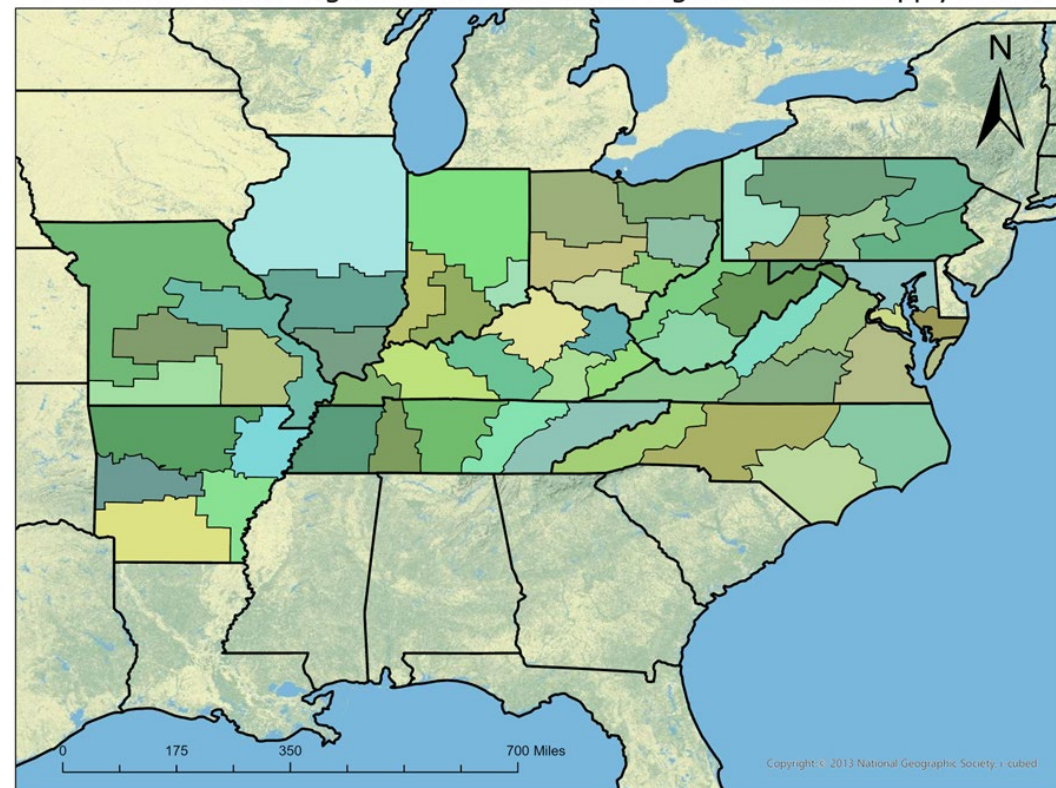
A. Economic Framework

$$\sum_i^{57} Q_{ijt}^S(P_{jt}; I_{ijt}, \gamma_j, \tau_j) = Q_{jt}^D(P_{jt}; G_{jt}, \epsilon_j) \quad \left. \vphantom{\sum_i^{57} Q_{ijt}^S} \right\} \text{Market Module}$$

B. Biological Framework

$$I_{ij,t+1} = I_{ijt} + \Delta I_{ijt} - H_{ijt}^* \quad \left. \vphantom{I_{ij,t+1}} \right\} \text{Inventory Module}$$

Delineation of Sub-regions in Hardwood Sub-regional Timber Supply Model



Demand scenarios

- Constant demand (base)
- 12 rising demand scenarios for high grade white oak sawtimber

Figure. High-grade select white oak growing stock inventory inflection points under alternative price elasticities of supply (γ_{HGWO}) and demand (ϵ_{HGWO}) for high-grade white oak

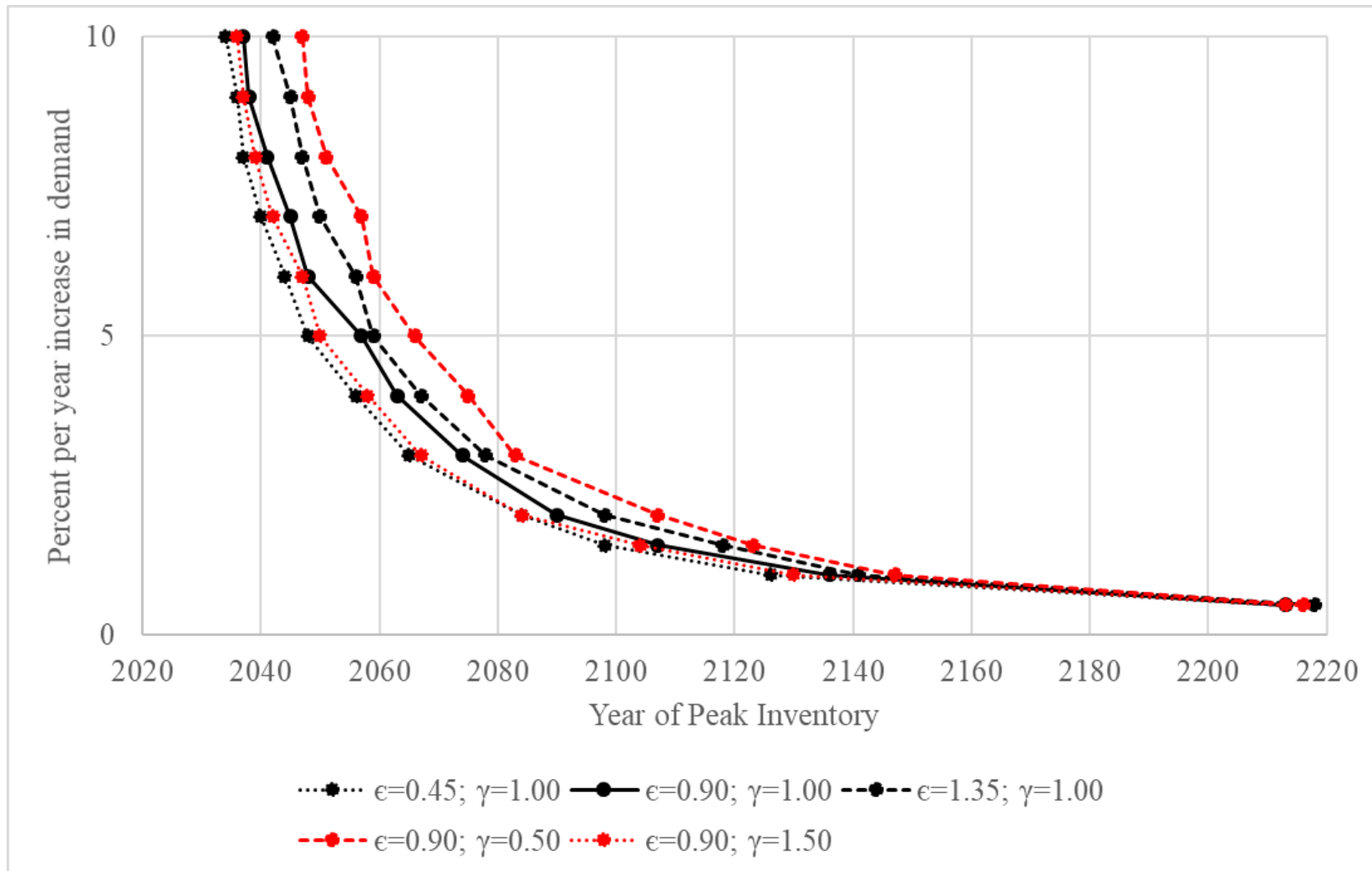
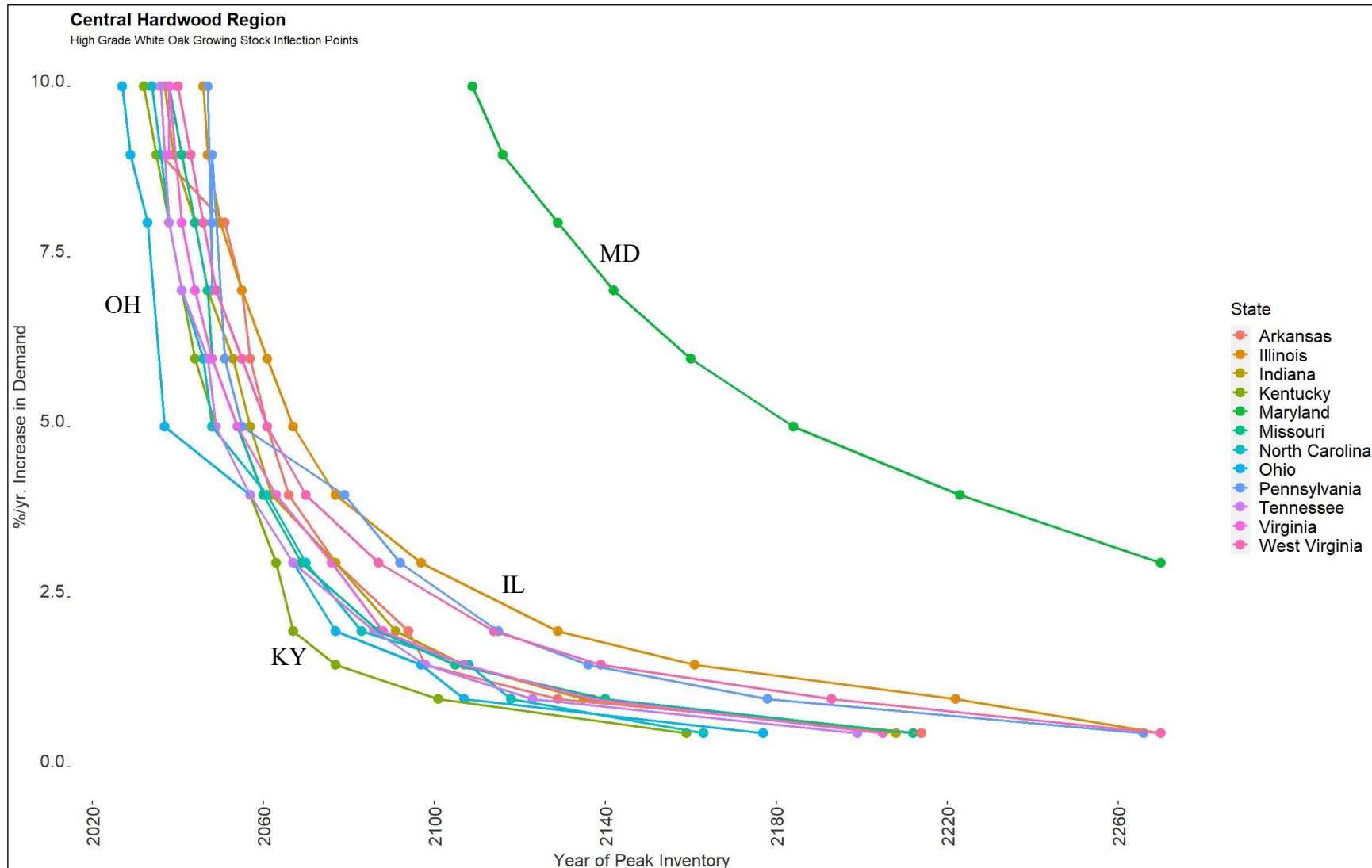


Figure. High-grade white oak growing stock inflection points across states in the CHR



Future directions of research

- Hardwood forest dynamics under mesophication
- Evaluating potential management interventions





Thank you!