Timber Supply Challenges in the Wake of Hurricanes

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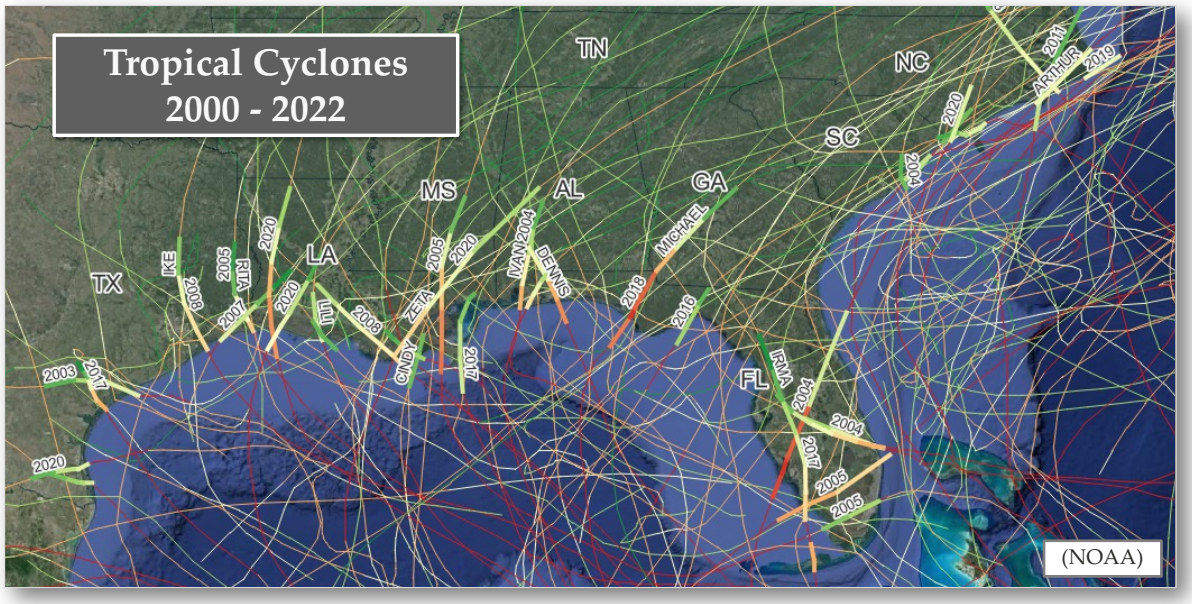

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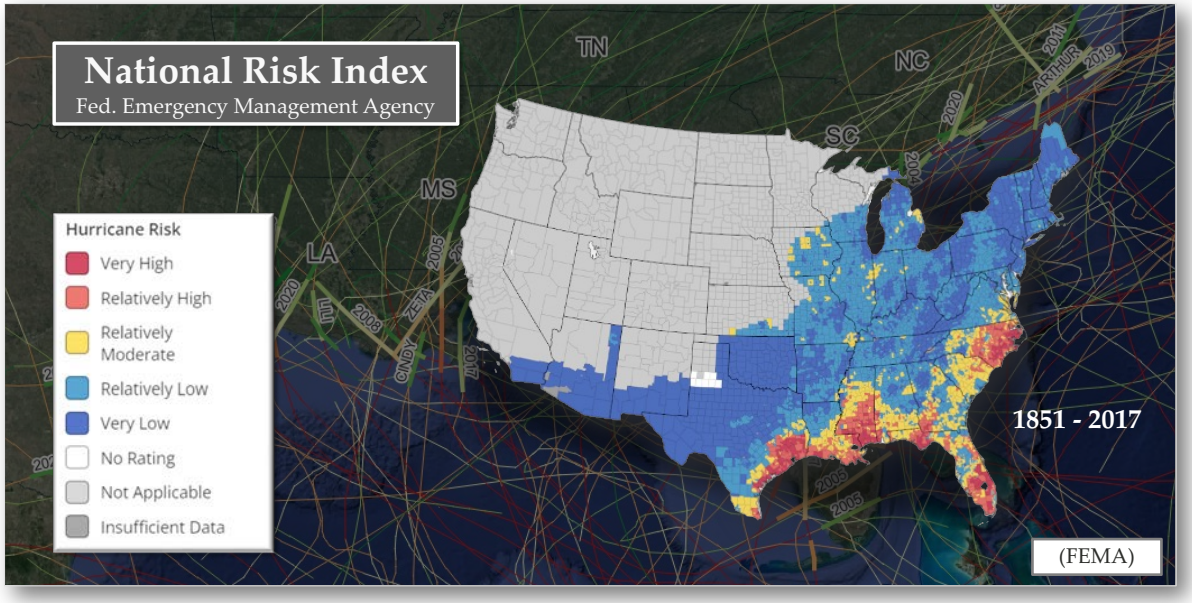

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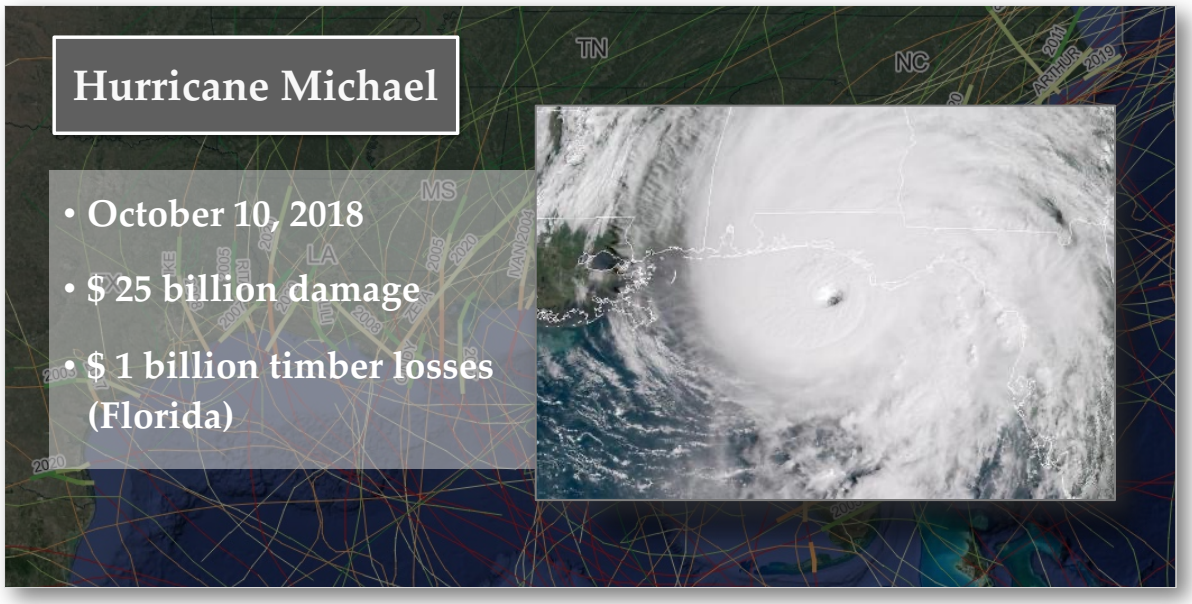

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Hurricane Michael

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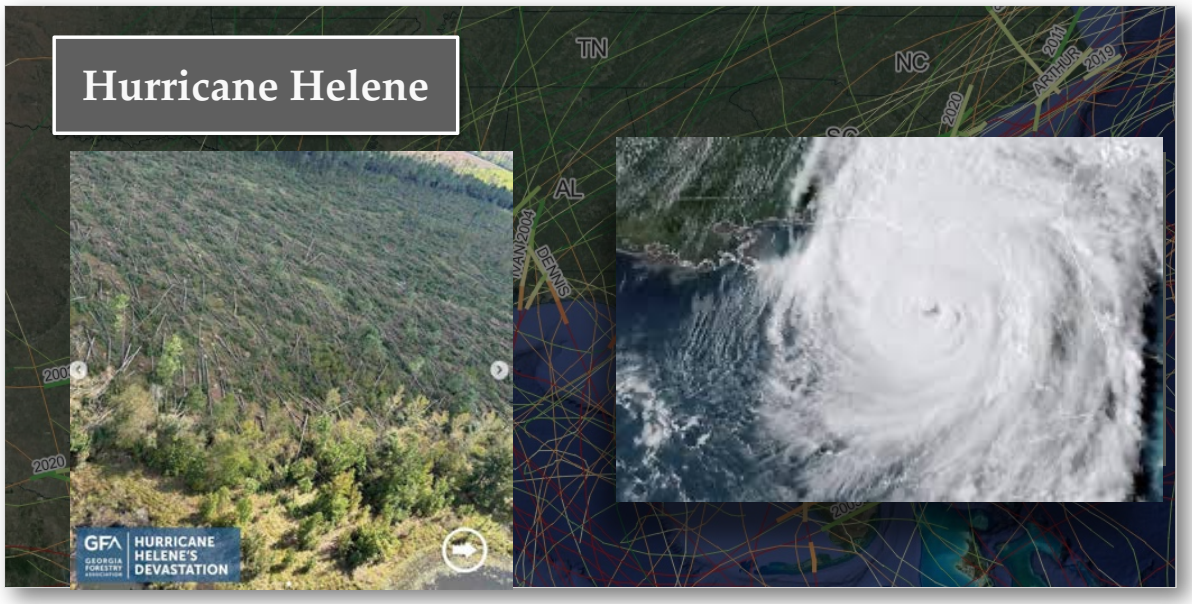
Hurricane Helene



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- **Salvage logging**
  - 10-35% of volume
  - 15% of value ($)

Prestemon and Holmes, 2010
Sun, 2016, 2020

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Objectives

- **Estimate the impact of hurricanes on timber supply**
  - **Estimate** damaged area & timber volume
  - **Identify** main goals & constraints
  - **Determine** priority sites for salvage
  - **Generate** valuable information

Landowners
Timber-consuming facilities
Policy-makers

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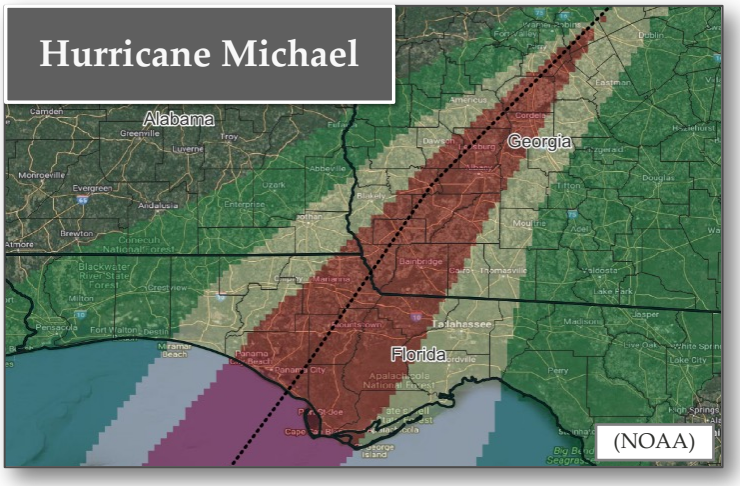
Methods

- Study Area

Hurricane Michael

- Florida
- Georgia
- Alabama



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Methods

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Understanding hurricane effects on forestlands: Land cover changes and salvage logging

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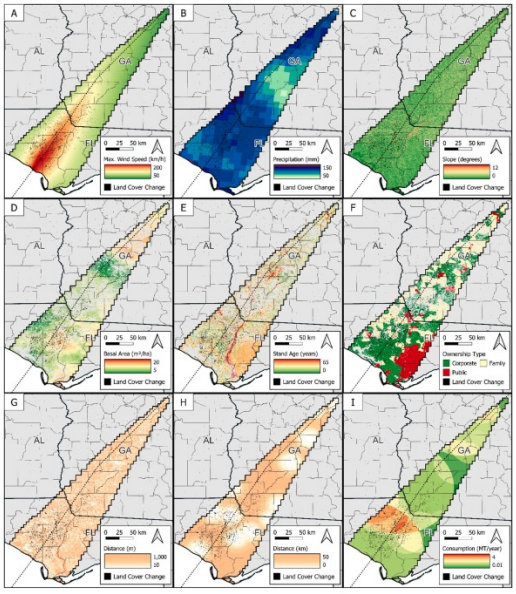

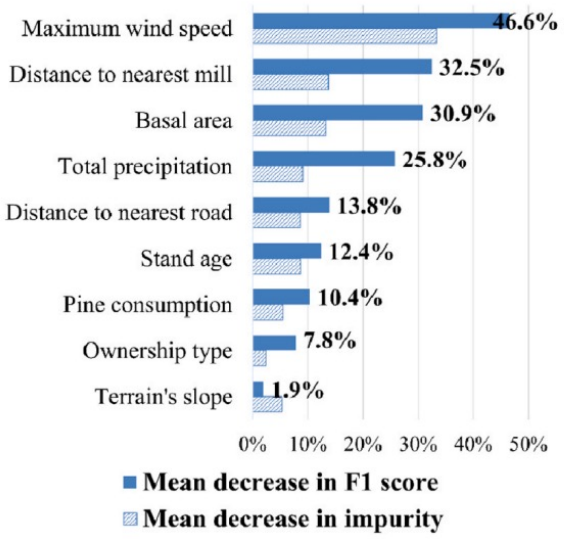

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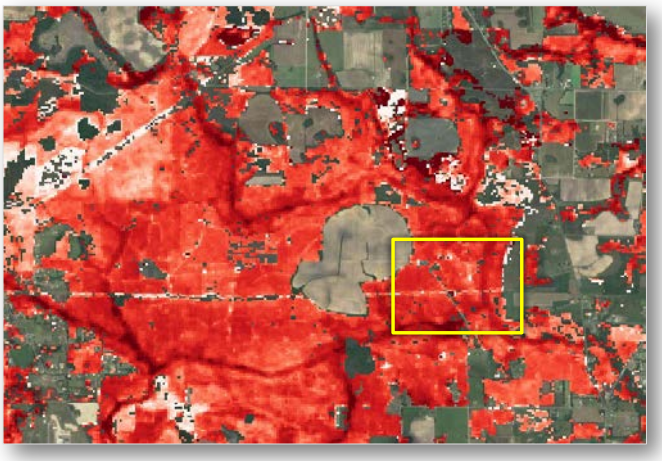
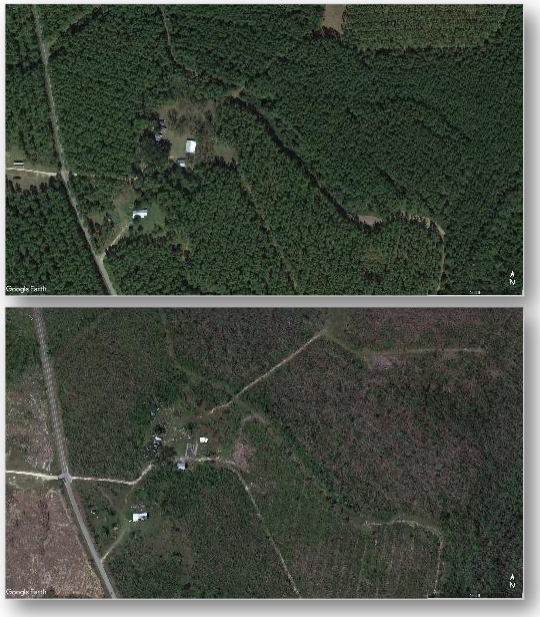
- Percentage change in **NDVI**





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Methods

- Develop a supply chain model
  - Spatial Equilibrium Timber Supply (SETS)

$$\min c'X$$

$s.t.$

Area Constraint
Inventory and Harvest Constraint
Supply and Demand
Structural Condition
(Previous Inventories)

where: c is the transportation costs; X is the volume harvested of timber flowing from market m to market m'

$m \in M$	Set of regional market
$m' \in M'$	Set of markets with at least one mill where $M' \subseteq M$.
$i \in I$	Set of age class
$p \in P$	Set of timber products (pulpwood and sawtimber)
$t \in T$	Set of timber periods

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Methods

- Simulation
  - **Optimal harvesting**

Business as usual (BAU)

Post-disturbance environment

- Southern US
- 5 years planning horizon
- "All damaged area" harvested at year 1!

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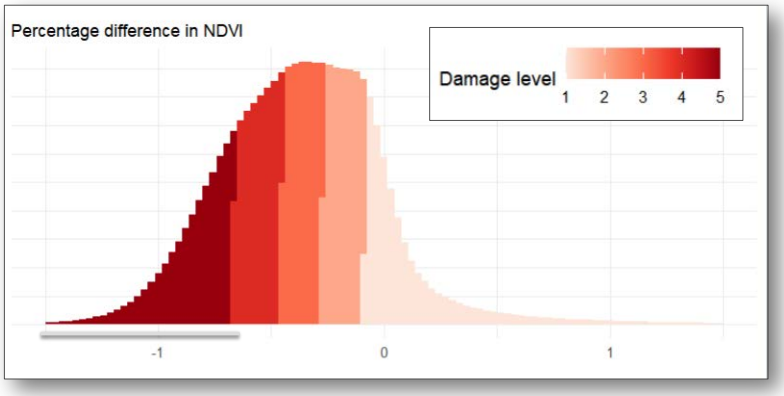
Results

- Damaged area

  - 15 counties
  - **50,000 hectares**
    Pine forests

"All damaged area"



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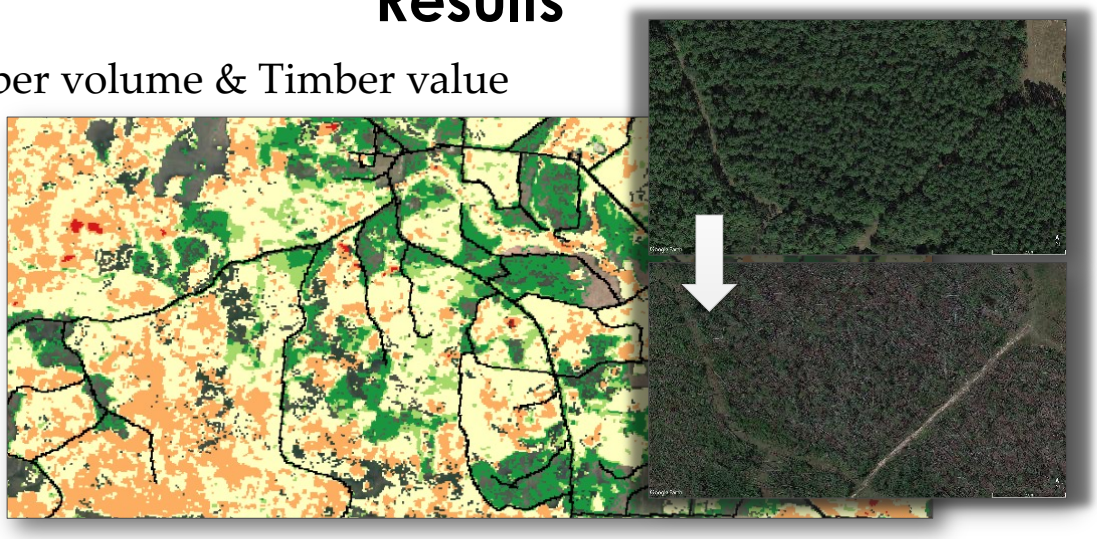
Results

- Timber volume & Timber value



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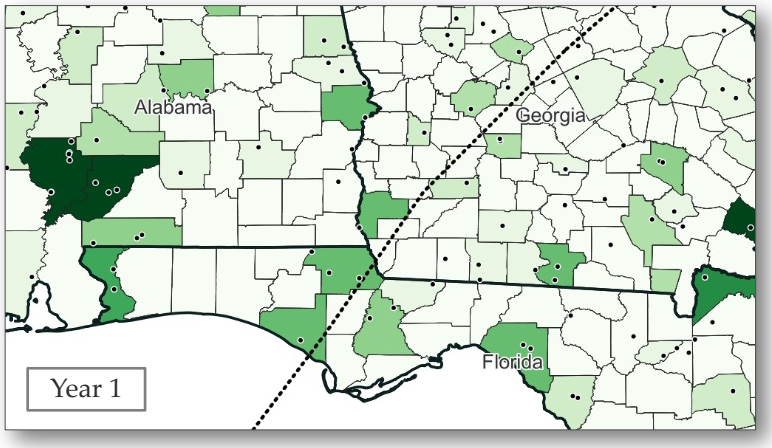
Results

- Simulation
  - **Timber Demand**

→ Before hurricane

=

→ After hurricane



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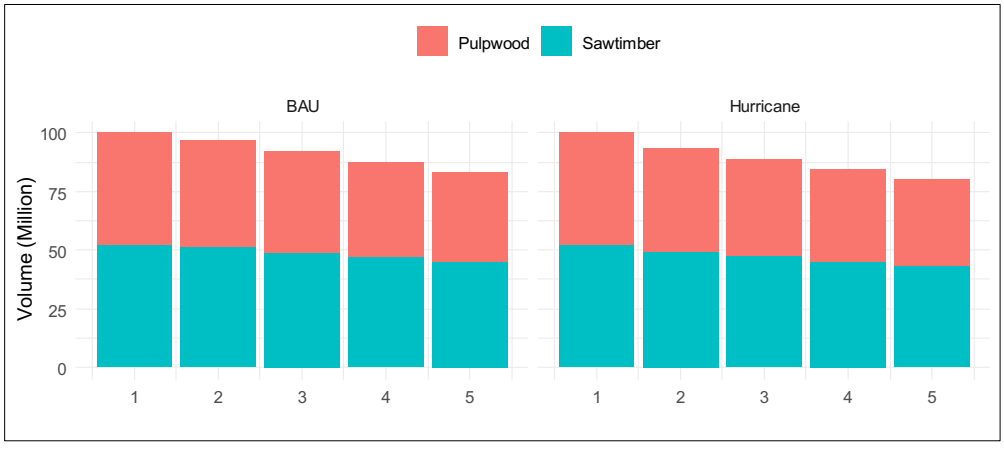
Results



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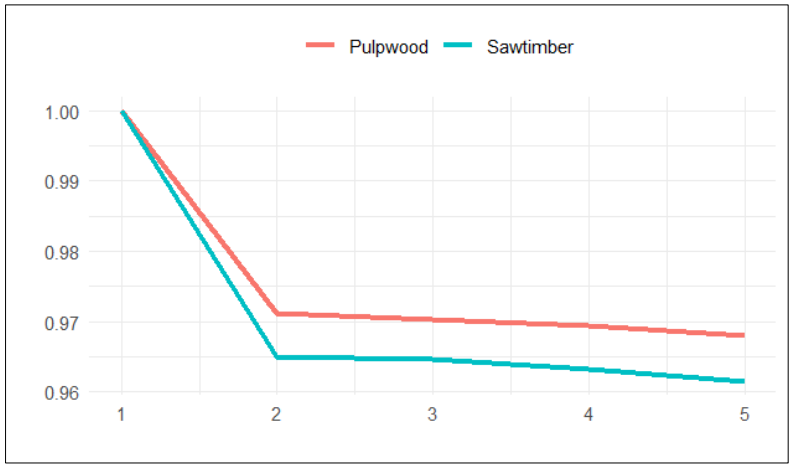
Results



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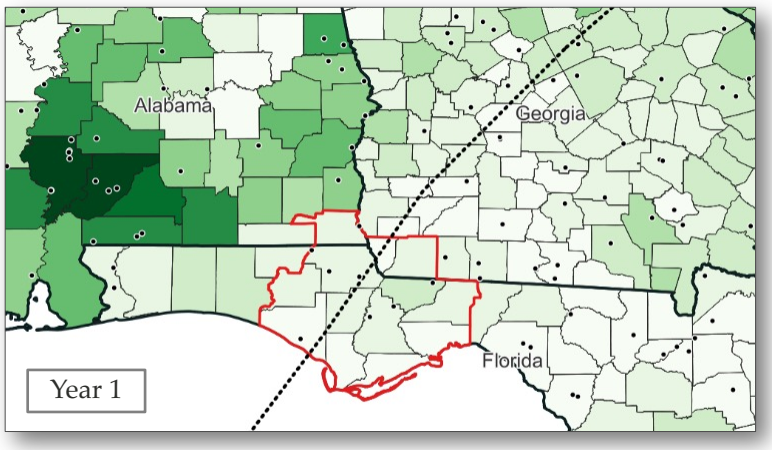
Results

- Simulation
  - **Timber Production**
  - → Before hurricane



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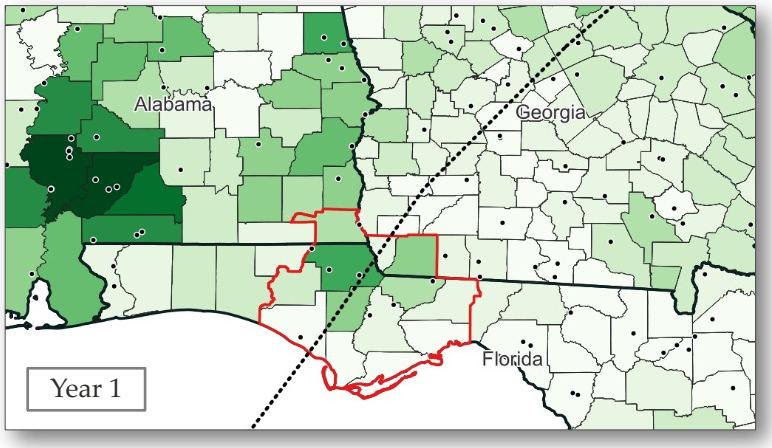
Results

- Simulation
  - **- Timber Production**
  - → After hurricane
  - **- Transportation costs**
    - **- 37% at year 1**
    - **+ 2% at years 2-5**



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Conclusion and Recommendations

- Hurricanes will cause a shock in the local market, with systematic increase on transportation costs
- To capture all the complexity of such an event, we need fine scale data at stand, track level.
- Thus, we could simulate not only timber supply, salvage, but also the interaction between the "agents".

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Thank you!

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