Does Diversity Matter? Social-ecological models of land managers and mesophication

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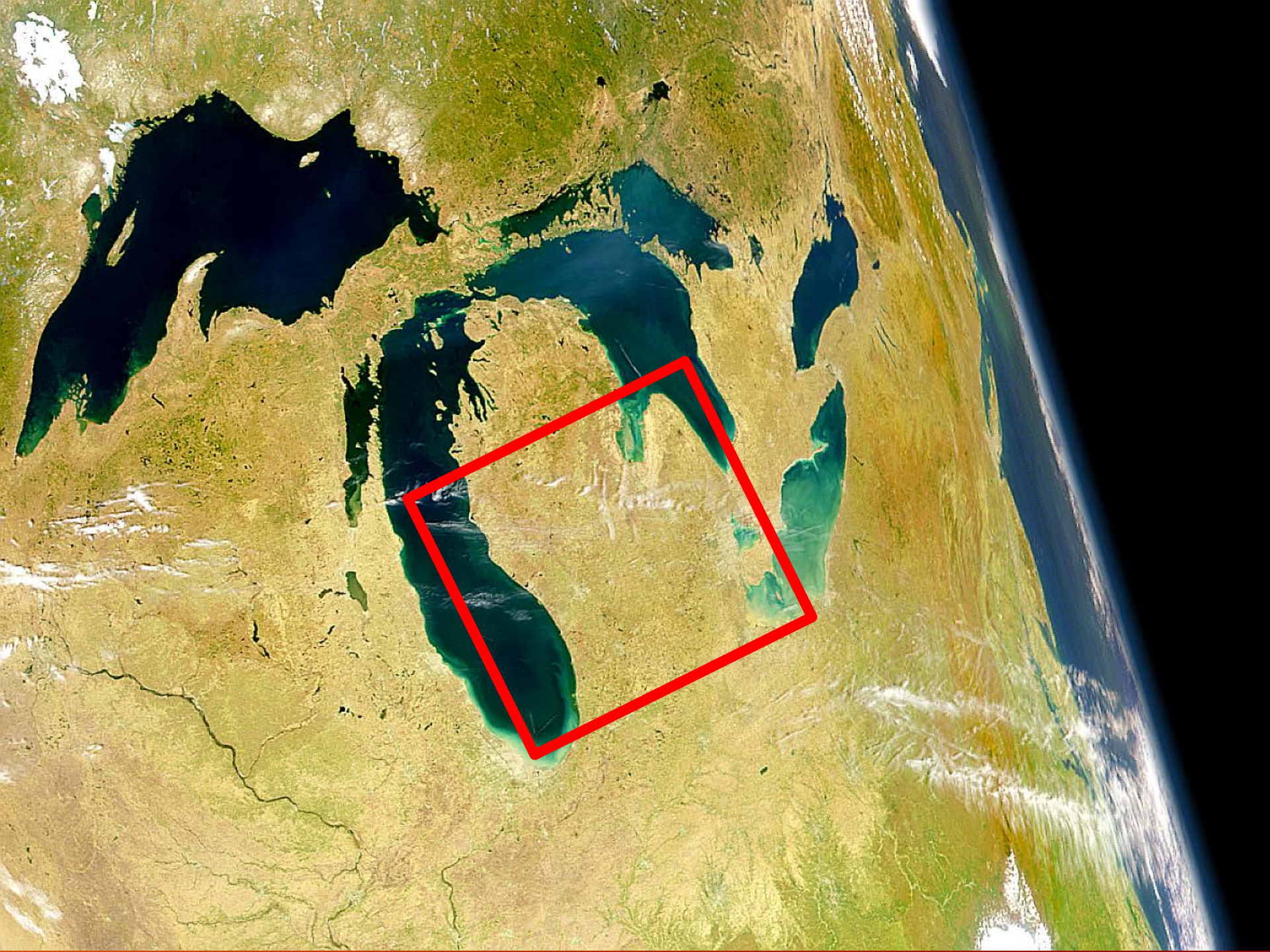
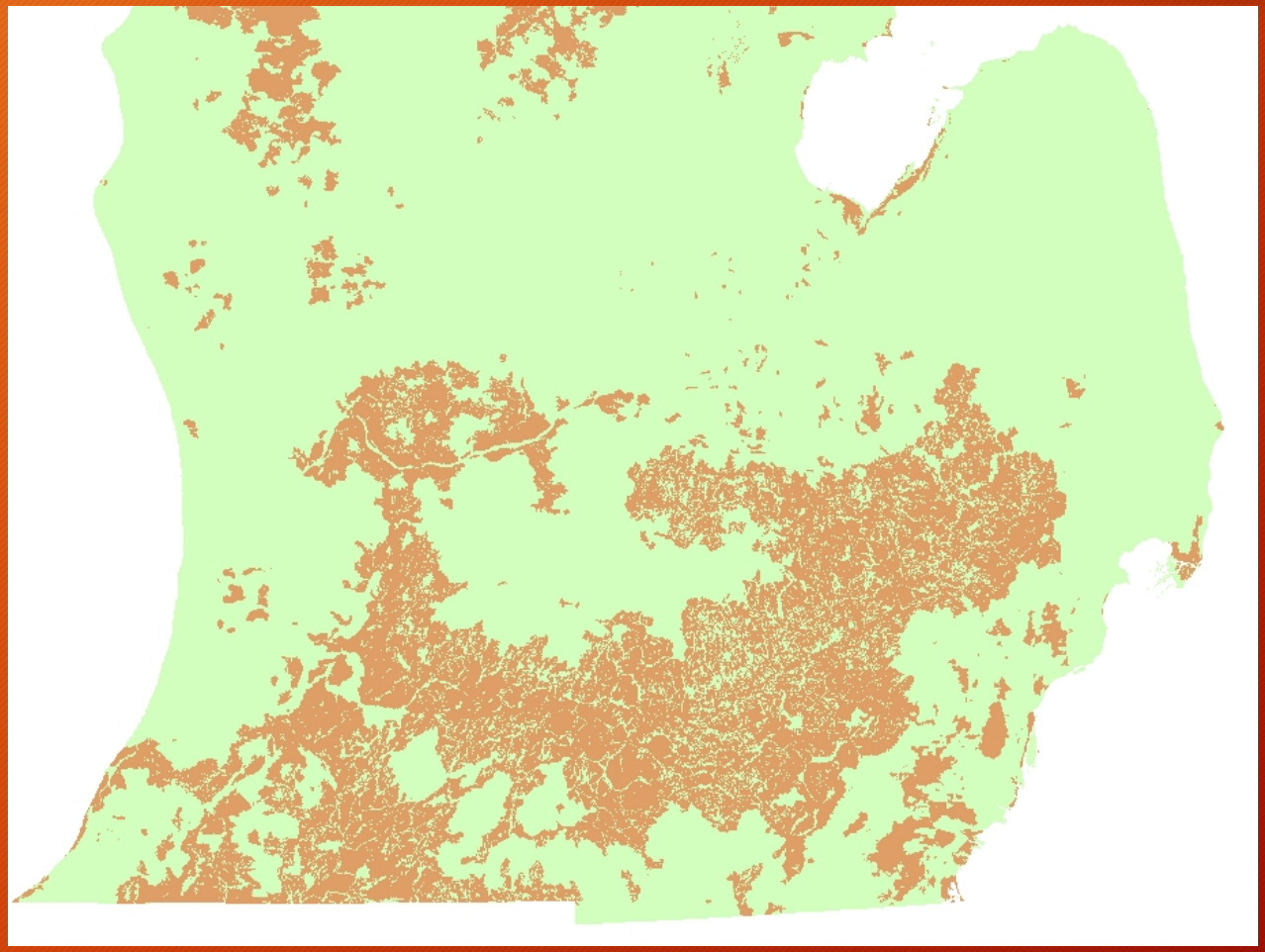
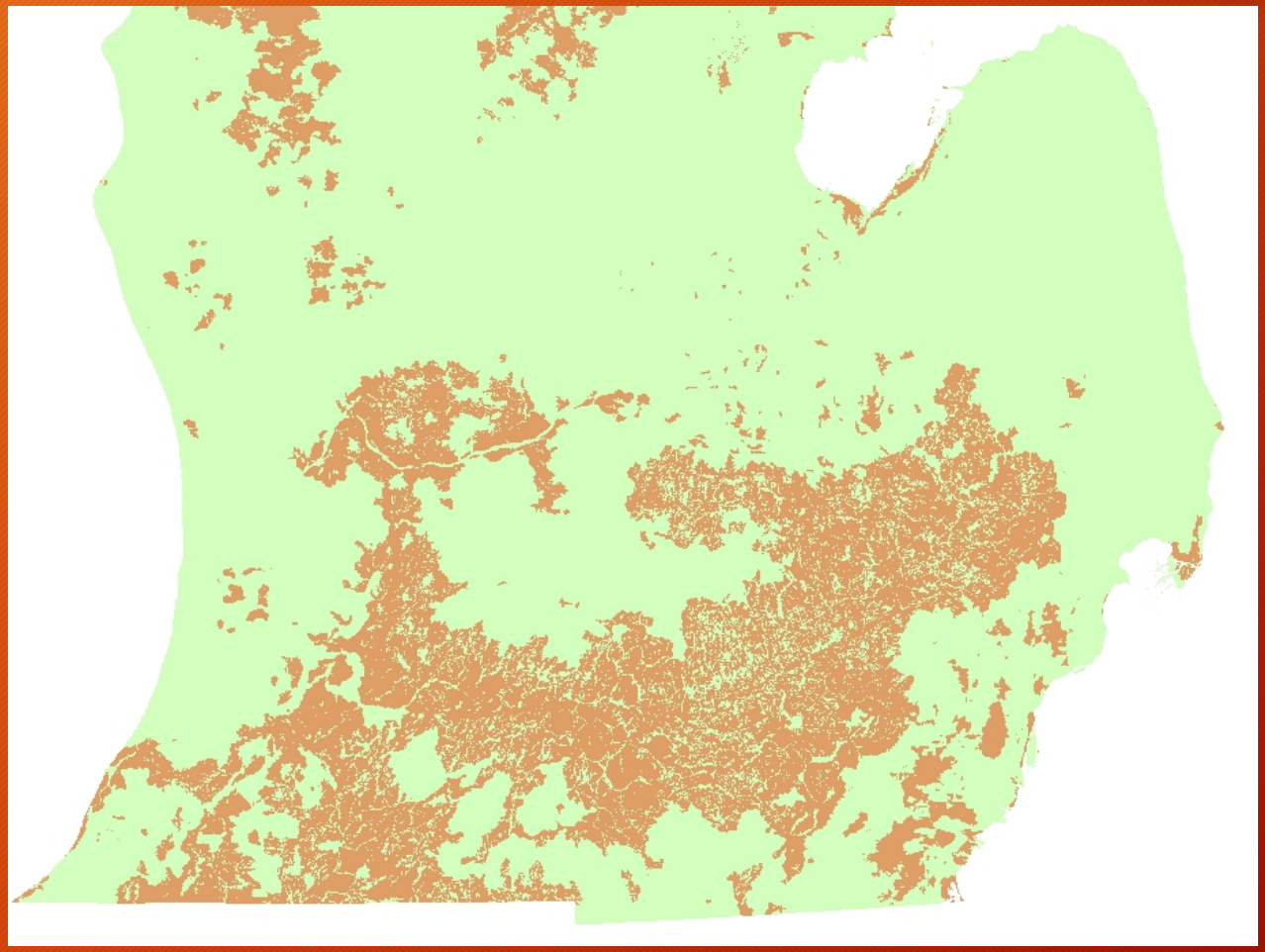


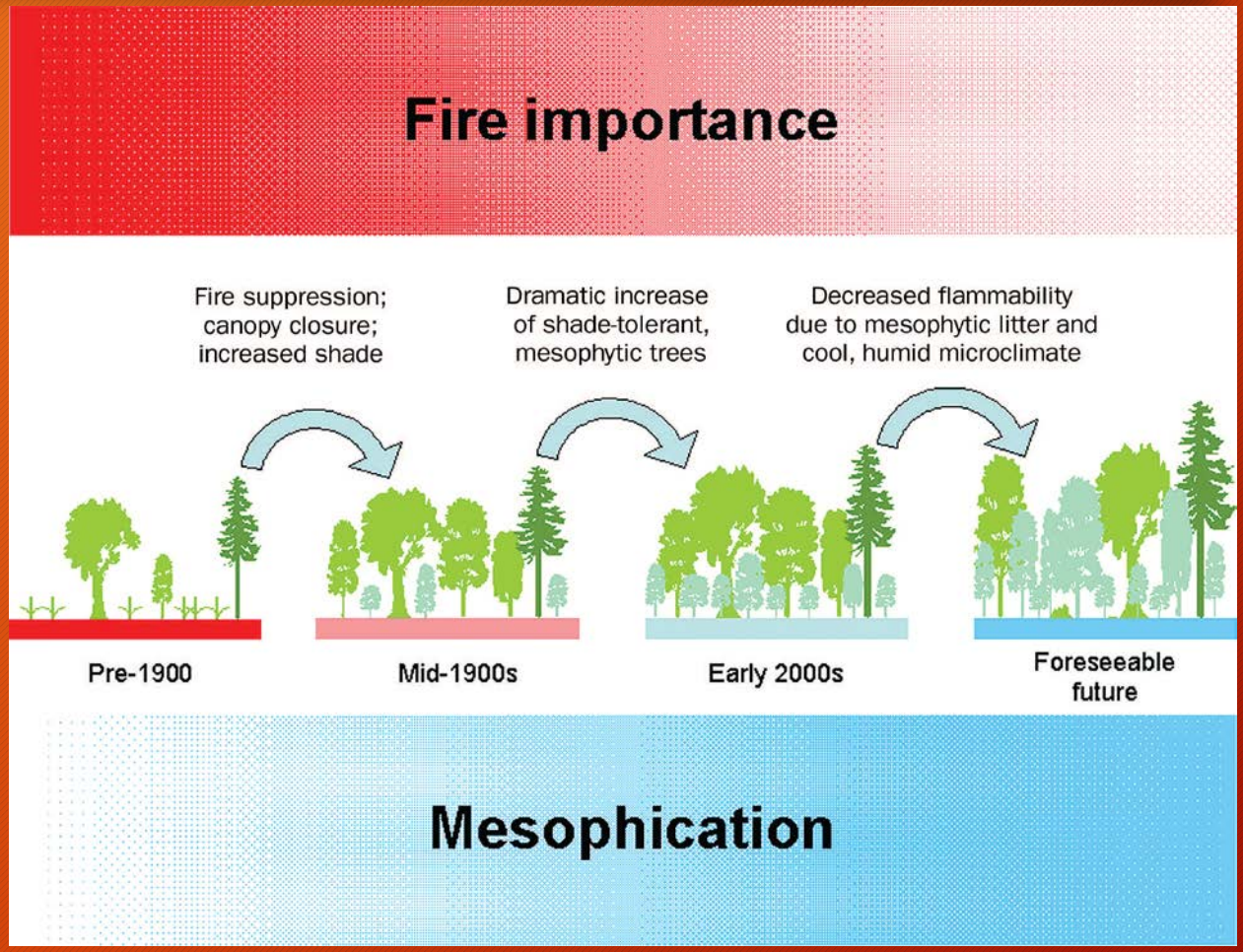
Pre-settlement map of Michigan



Pre-settlement/post-apocalyptic map of Michigan

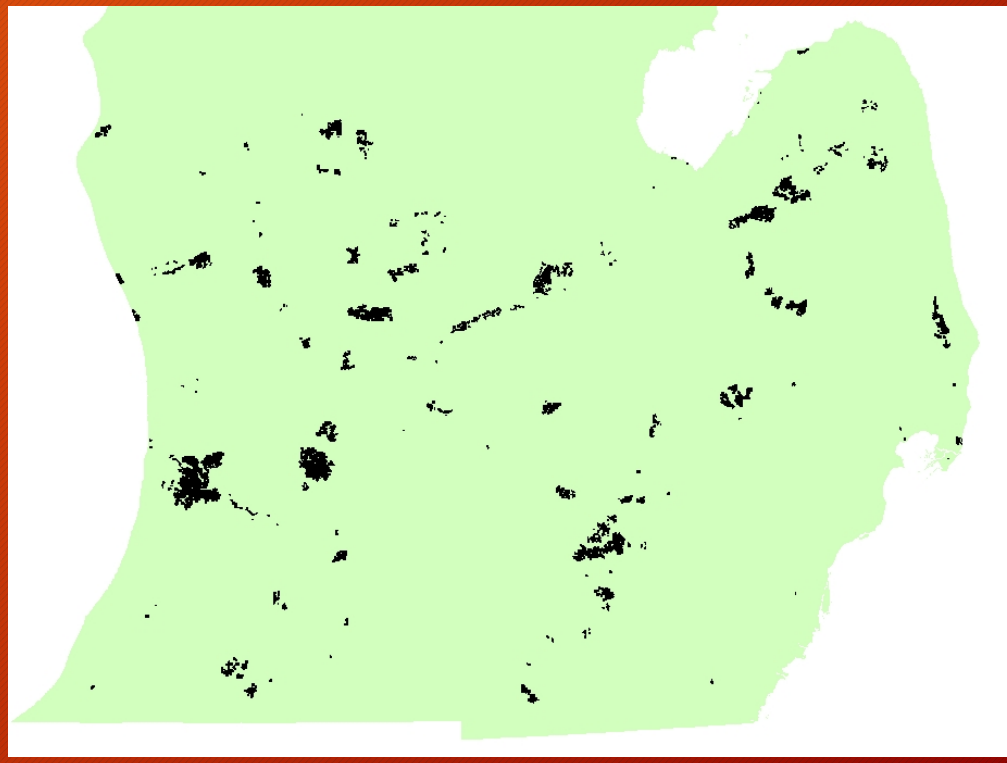


Oak mesophication

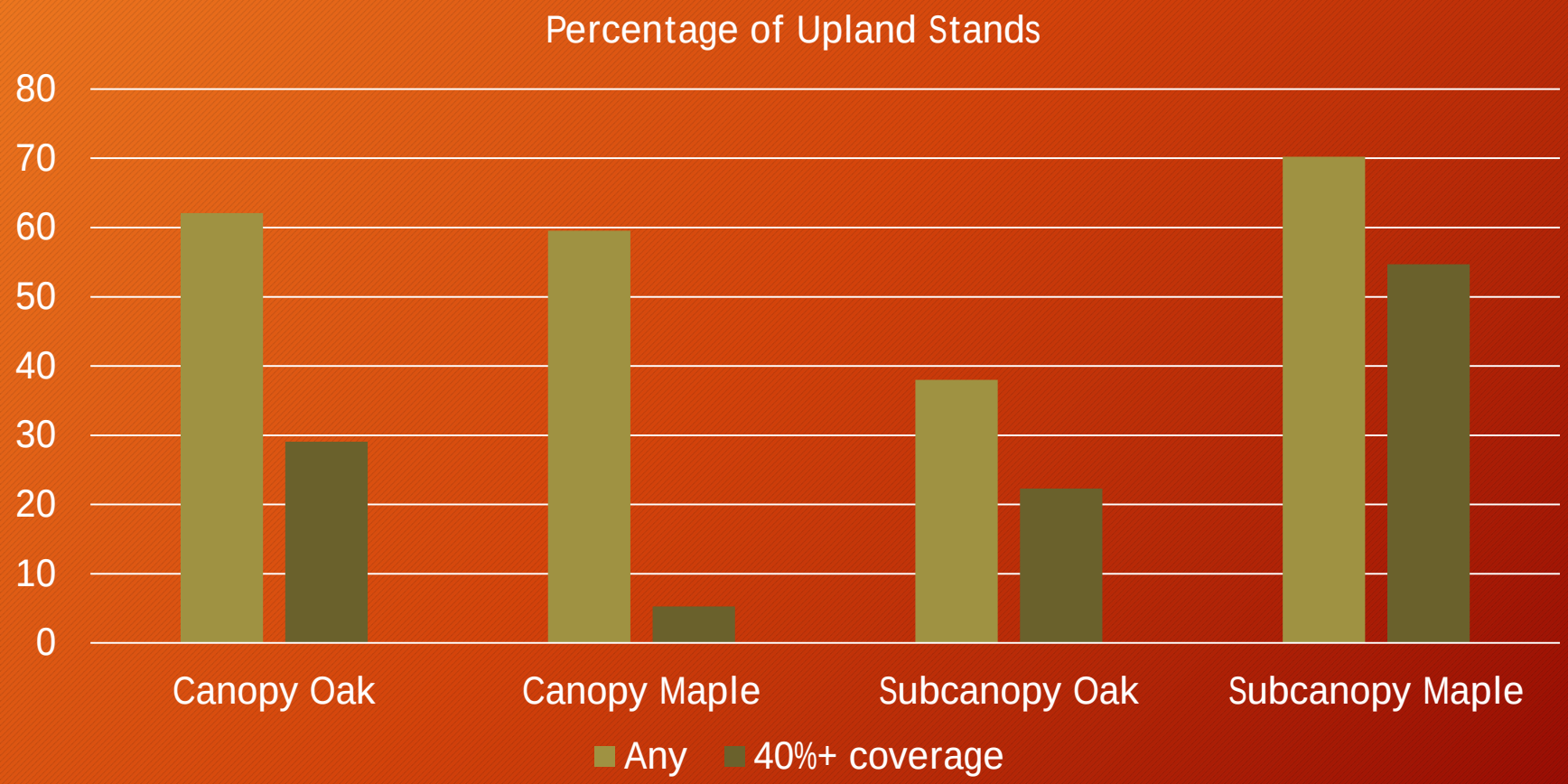


Mesophication on state land

- 200K hectares of state land
- 60% of canopy biomass is oak
- Maintain or increase



Not walking the walk



Not walking the walk

- Fire need analysis
  - 34,500 ha annually?
  - 1,100 – 7,700 ha annually?
- Recent prescribed fire activity
  - 2016: 2,103 ha
  - 2017: 2,268 ha
  - 2018: 1,861 ha

Innovation in land management

- People recognize a problem
- People try a variety of different approaches
- People copy each other
- Solutions propogate

Objectives

- Can we model variation among land managers?
- What is essential to a social-ecological model of mesophication?
- What experiments can we run via simulation?

Agent based models

- Interviews pointed toward complex systems
- Agent diversity
- Feedbacks
- Emergence

Experiments

- Psychology: Motivation theory
- Ecology: pyrodiversity hypothesis
- Climate: adapting to change

Agents

- Agents are 13 wildlife managers and 2 fire managers
- Managers vary in
  - Motivation
  - Priority setting
  - Monitoring

Landscape

- 7,020 upland stands from Michigan Forest Inventory
- Canopy and subcanopy species
- Species have
  - Health (canopy cover)
  - Pyricity/sensitivity
  - Coefficient of conservatism

Ecological process overview

- Stands either burn
- Or do not burn
- Each year
- Repeat for 80 years

Social-ecological model

- What rules determine who burns when?
- How do they decide?
- How do they adapt?
- How do those decisions affect mesophication? Or biodiversity?

What experiments are better run in simulation?

- Long term pyrodiversity begets biodiversity
- Priority setting and its effects on motivation, fairness, and jealousy
- Adapting as innovating to a new climate

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Questions?