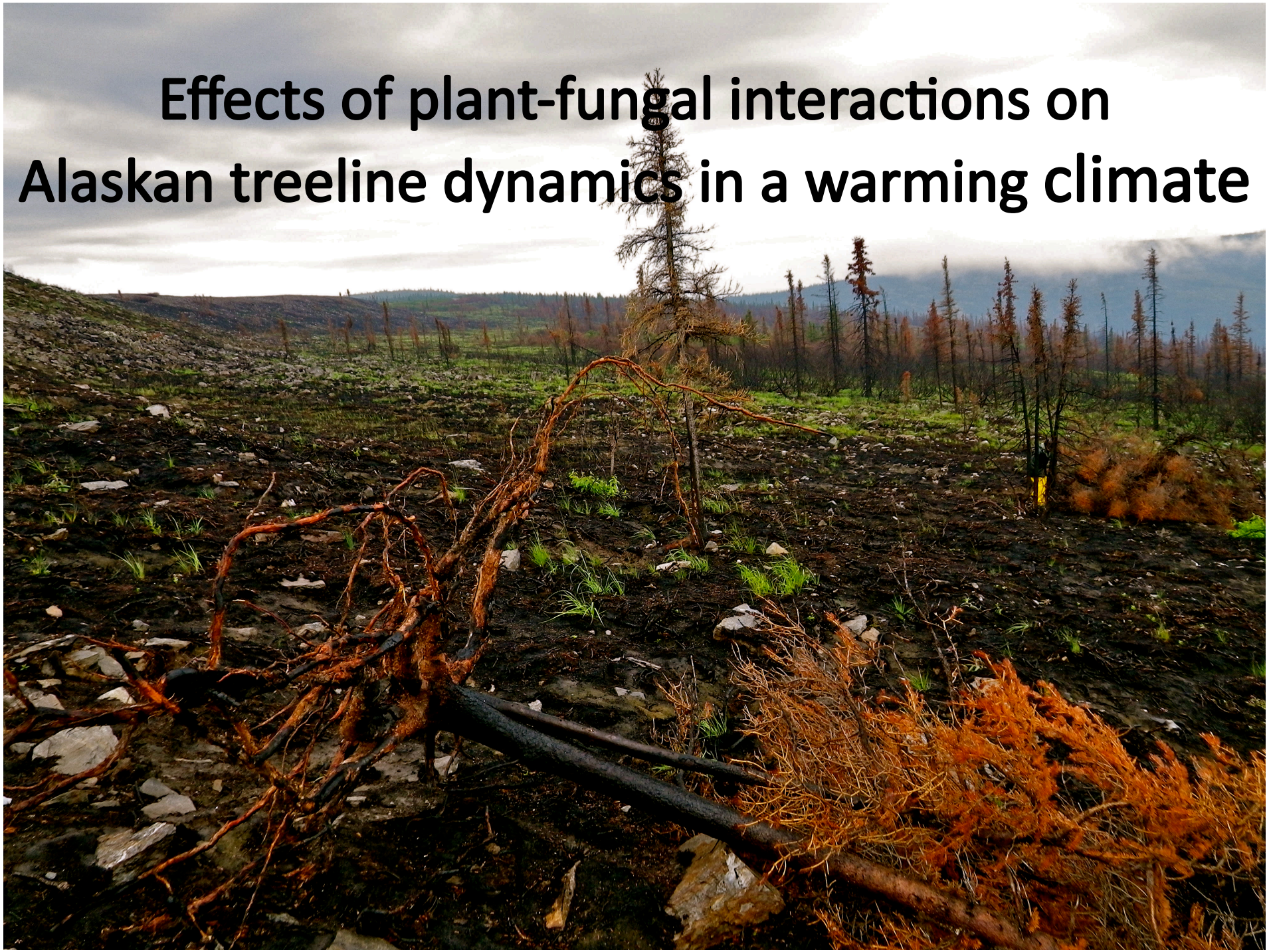
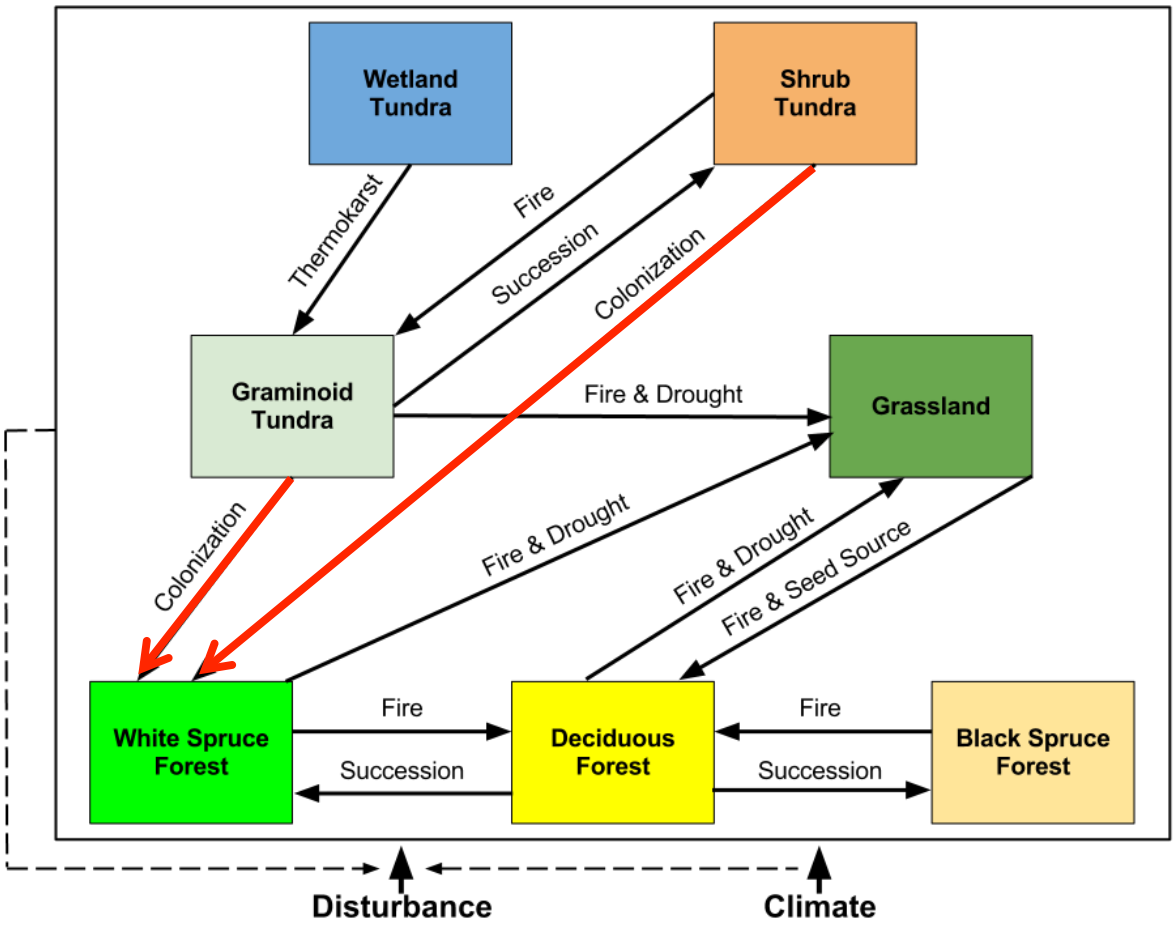
Effects of plant-fungal interactions on Alaskan treeline dynamics in a warming climate



ALFRESCO state transitions



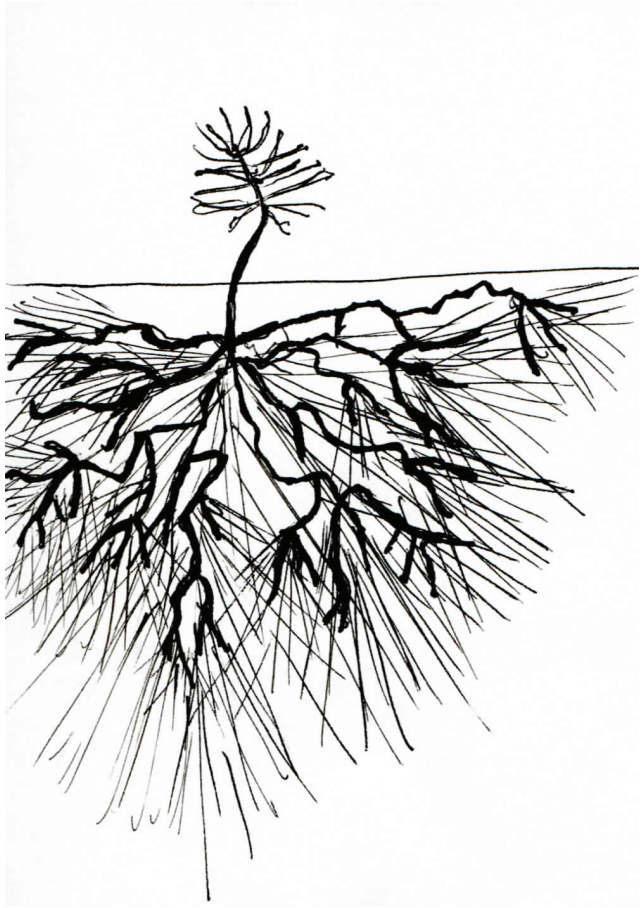
Conceptual diagram of the processes affecting state transitions in ALFRESCO. Arrows indicate causal relationships (Breen et al. 2013, Gray et al. 2013)

Seedling Recruitment

- Seedling recruitment → changes in species distributions
  - Dispersal
  - Establishment
  - Growth
- Fire hypothesized to facilitate treeline expansion
  - Kills plant competitors
  - Opens up high-quality microsites
  - E.g., Fire linked to lodgepole pine migration and tundra shrub expansion

EMF-seedling interactions

- Ectomycorrhizal Fungi (EMF)
  - Conduits of soil nutrients and water
  - Pathogen resistance
  - Facilitate establishment and growth



Fire effects on EMF

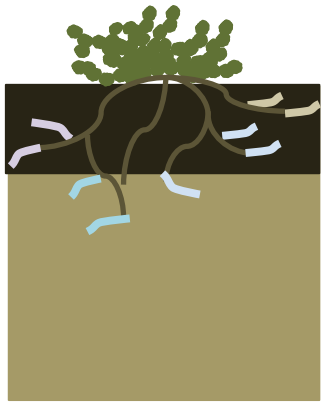
- Fire severity
  - Combustion of soil
  - Kills host plants

Low severity

Low combustion

Low host plant death

High EMF legacy

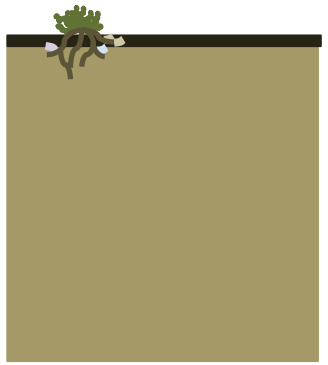


High severity

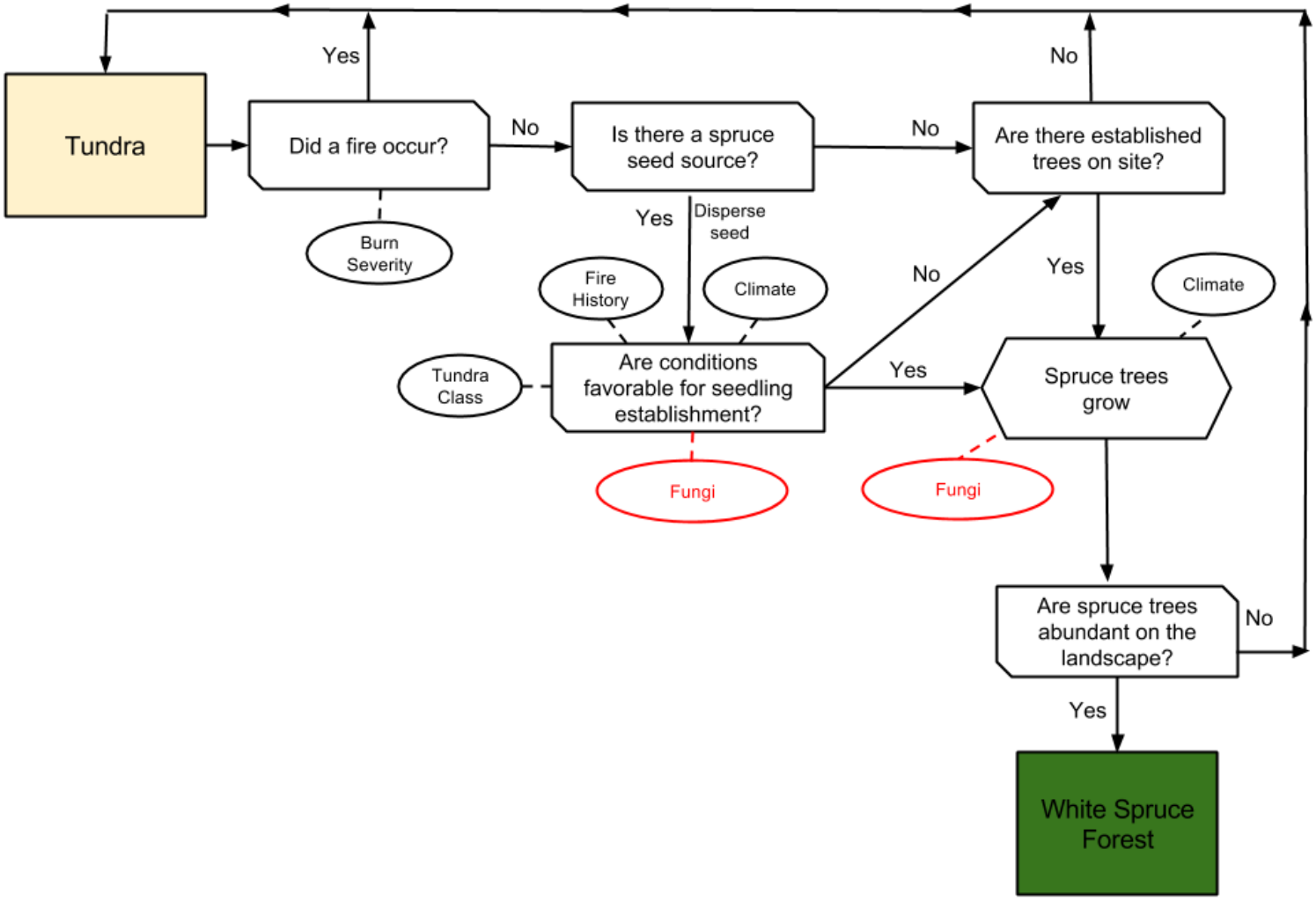
High combustion

High host plant death

Low EMF legacy



EMF-seedling interactions inform model



Conceptual diagram of the processes affecting state transitions from tundra to spruce in ALFRESCO. Arrows indicate the progression from one step in the transition process to the next step in the process. Figure modified from work by the ALFRESCO 2.0 Team (Breen et al. 2013, Gray et al. 2013)

EMF-seedling interactions modify establishment and growth