Projecting the radial growth of shelterbelts across the southern half of Saskatchewan

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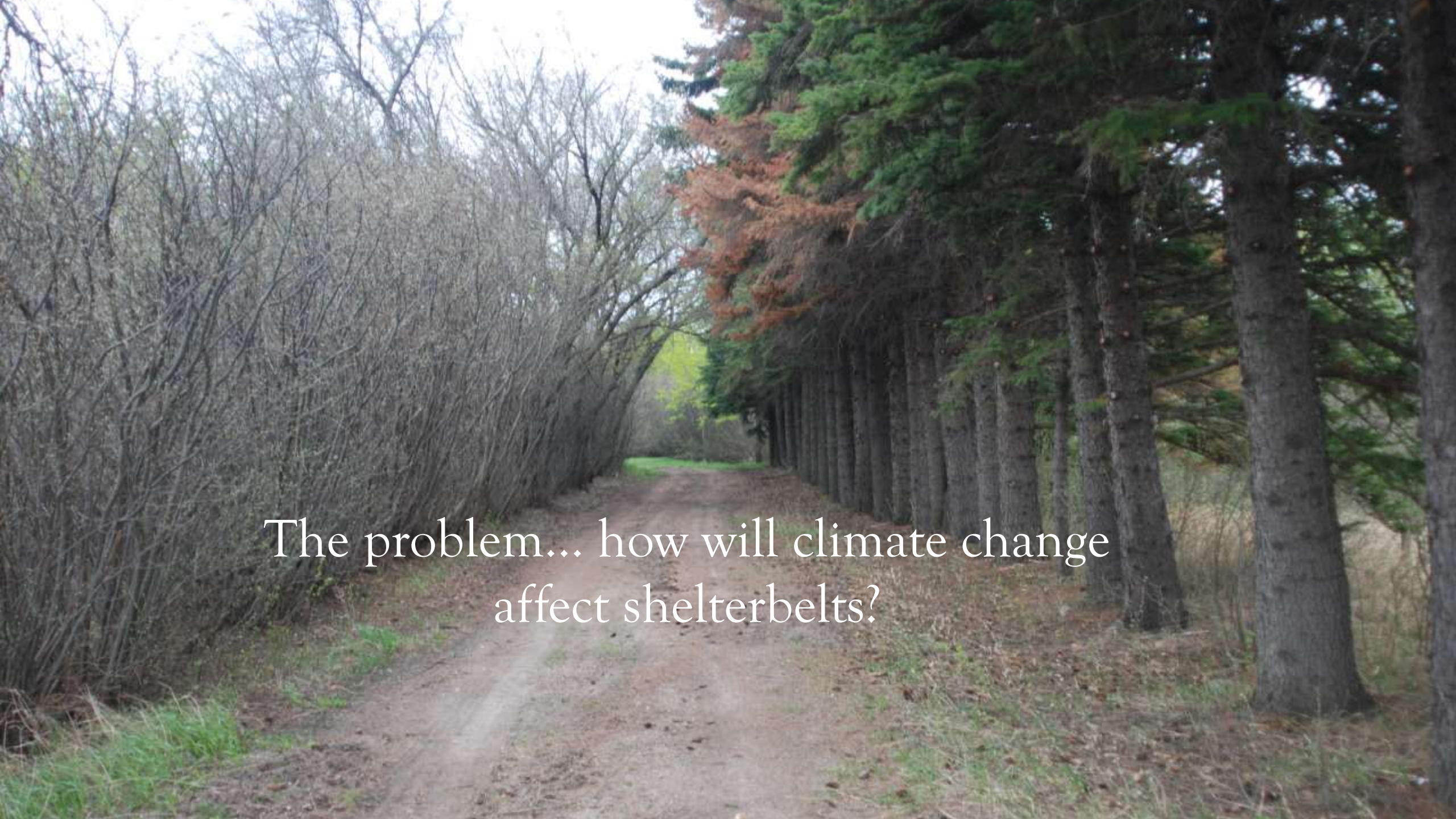
Phase 1: 2011-2016

- Shelterbelt inventory
- Lots of samples!

Phase 2: 2017-2021

- Build off knowledge from phase 1
- Create shelterbelt app


The problem... how will climate change
affect shelterbelts?

Objectives

- Make a model to forecast the growth of four shelterbelt species under future climate models and different scenarios.
- Determine if there is a pattern of forecasted growth across the Brown, Dark brown, and Black soil zones of Saskatchewan.

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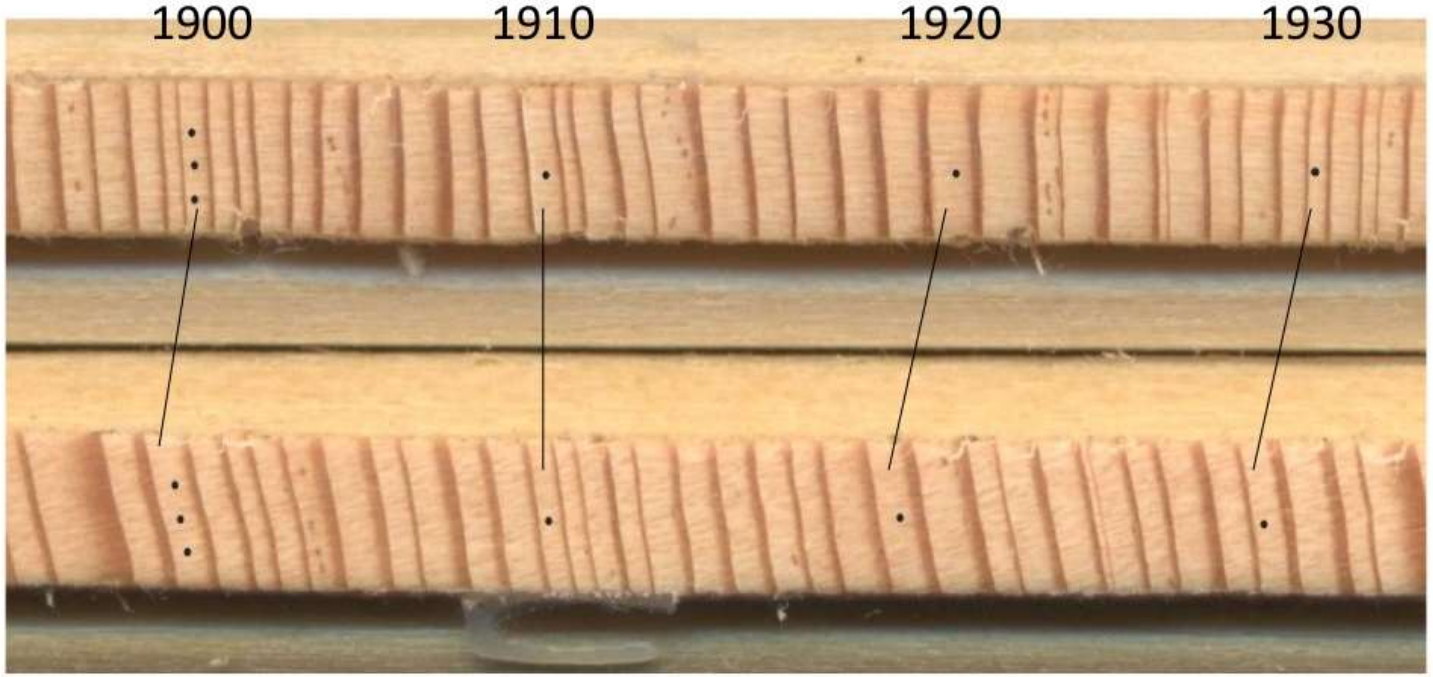
Shelterbelt Species

- White spruce (*Picea glauca*)
- Scots pine (*Pinus* sylvestris)
- Green ash (*Fraxinus pennsylvanica)*
- Hybrid poplar (*Populus* hybrids)

Dendrochronology

The study of tree rings – because tree rings tell a story

Same climate influences the growth of all trees at a site = **cross-dating**



Two Douglas-fir trees near Eldorado Springs, CO

Future Climate Data

2 Representative Concentration Pathways

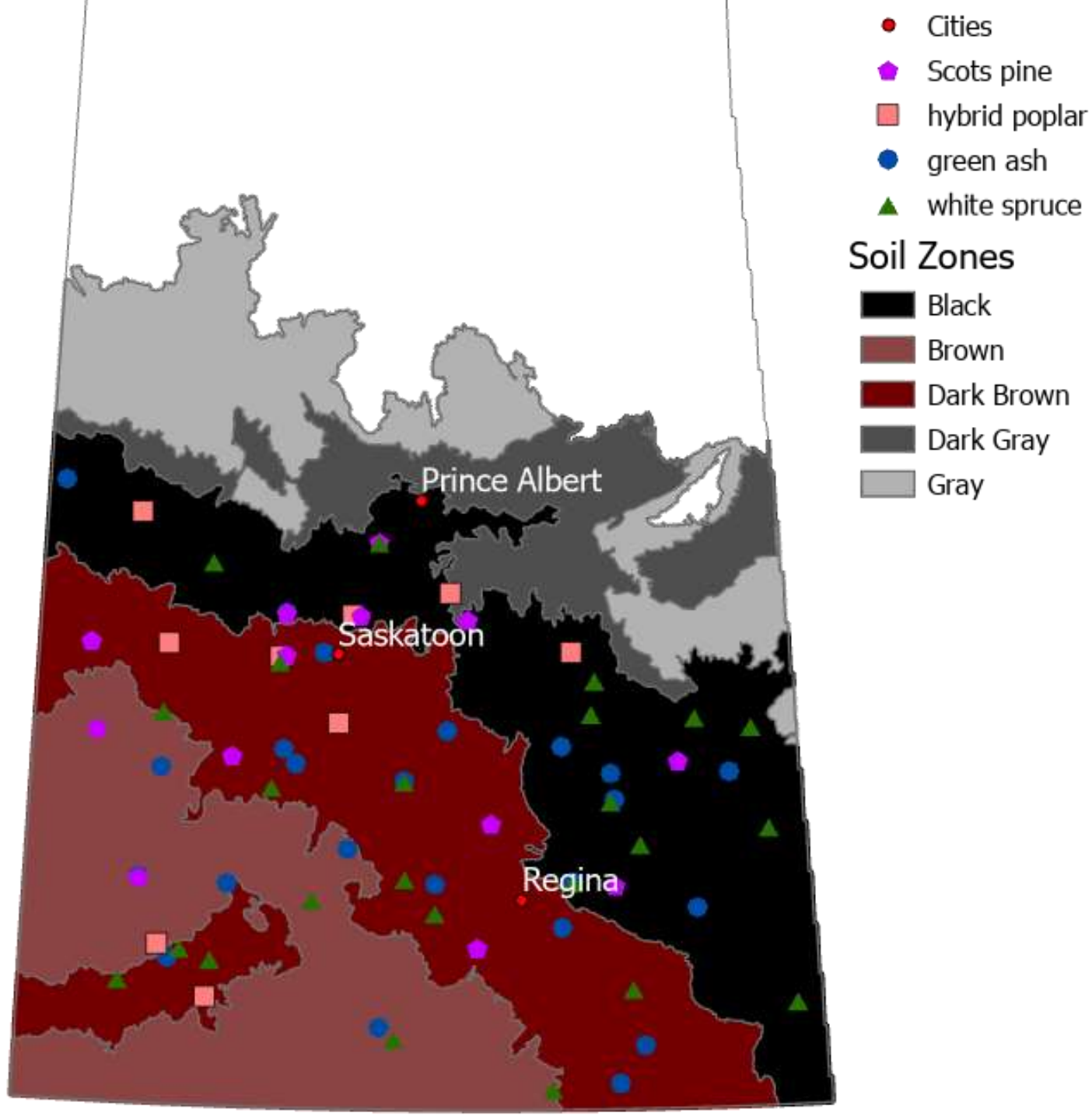
- RCP 45
- RCP 85

4 Climate Models

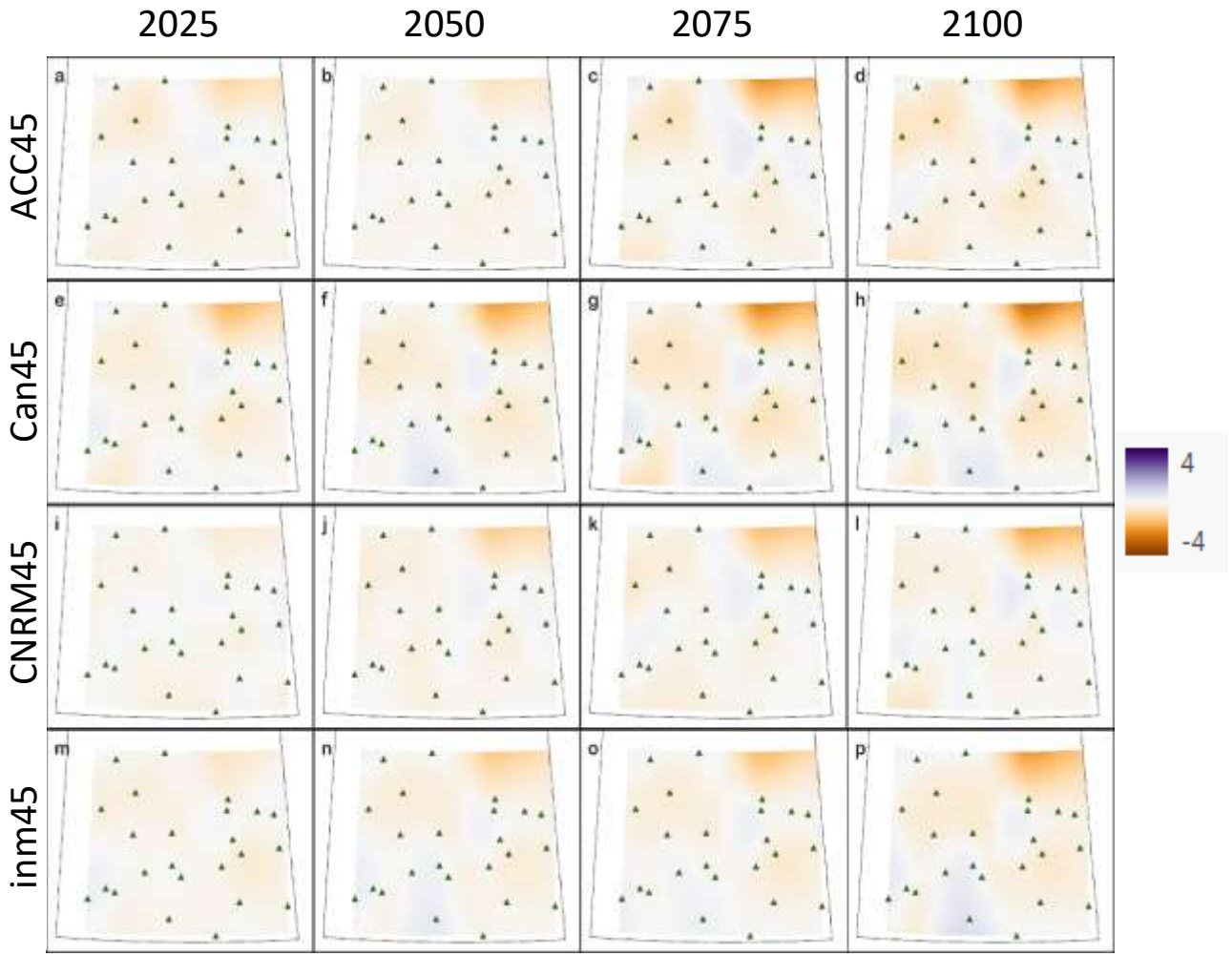
- ACCESS1-0-r1 (ACC)
- CanESM2-r1 (Can)
- CNRM-CM5-r1 (CNRM)
- Inmcm4-r1 (inm)

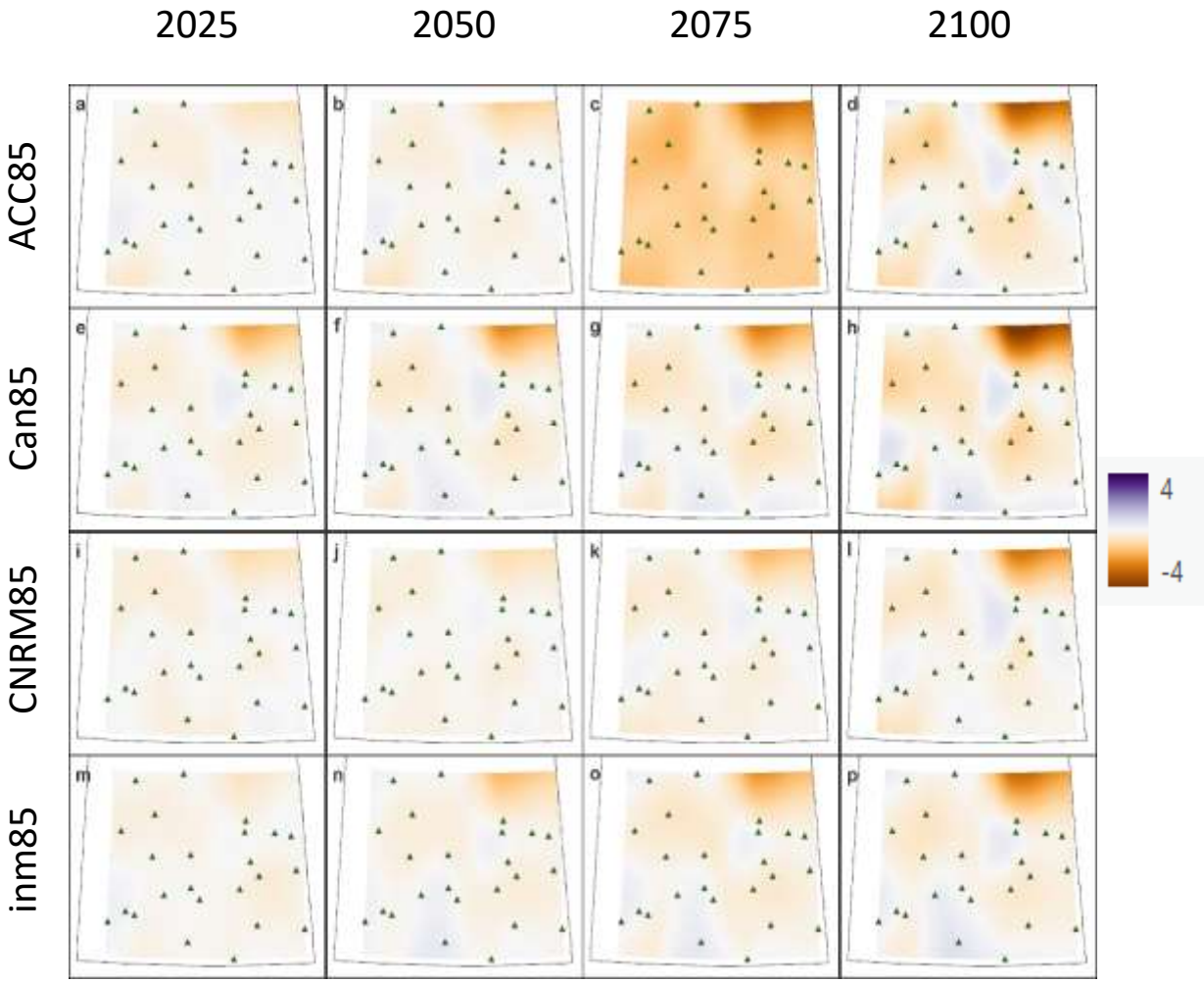
Sample Analysis and Modeling

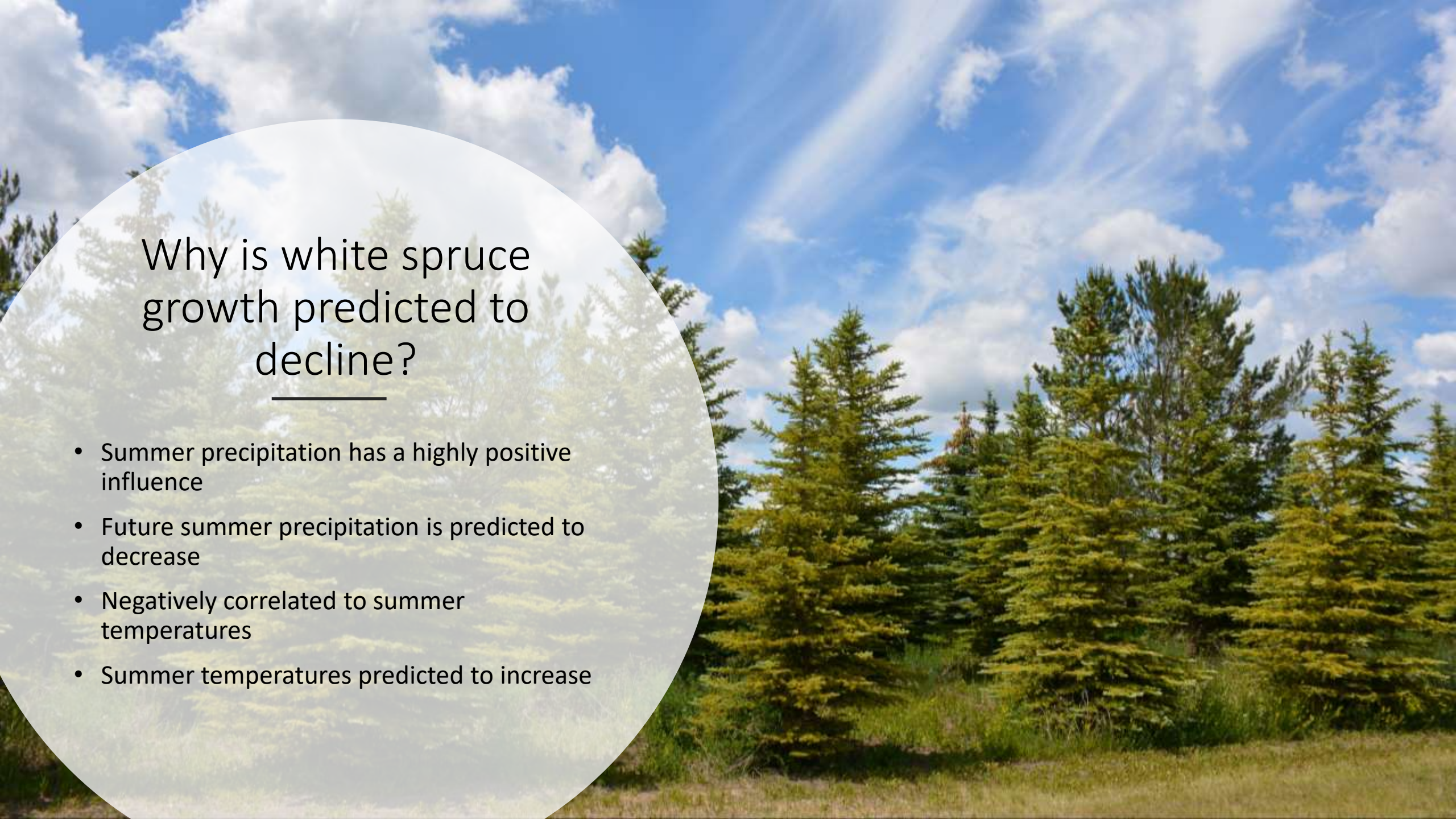
- Used AGGP1 samples and sampled my own
- Took 40 tree cores from 20 trees at each site
- Measured tree rings and compared to past climate
- Put this data and future climate data into a model to predict future radial growth
- Avg predicted future growth – Avg past growth


Prince Albert
Saskatoon
Regina
Cities
Scots pine
hybrid poplar
green ash
white spruce
Soil Zones
Black
Brown
Dark Brown
Dark Gray
Gray

White Spruce



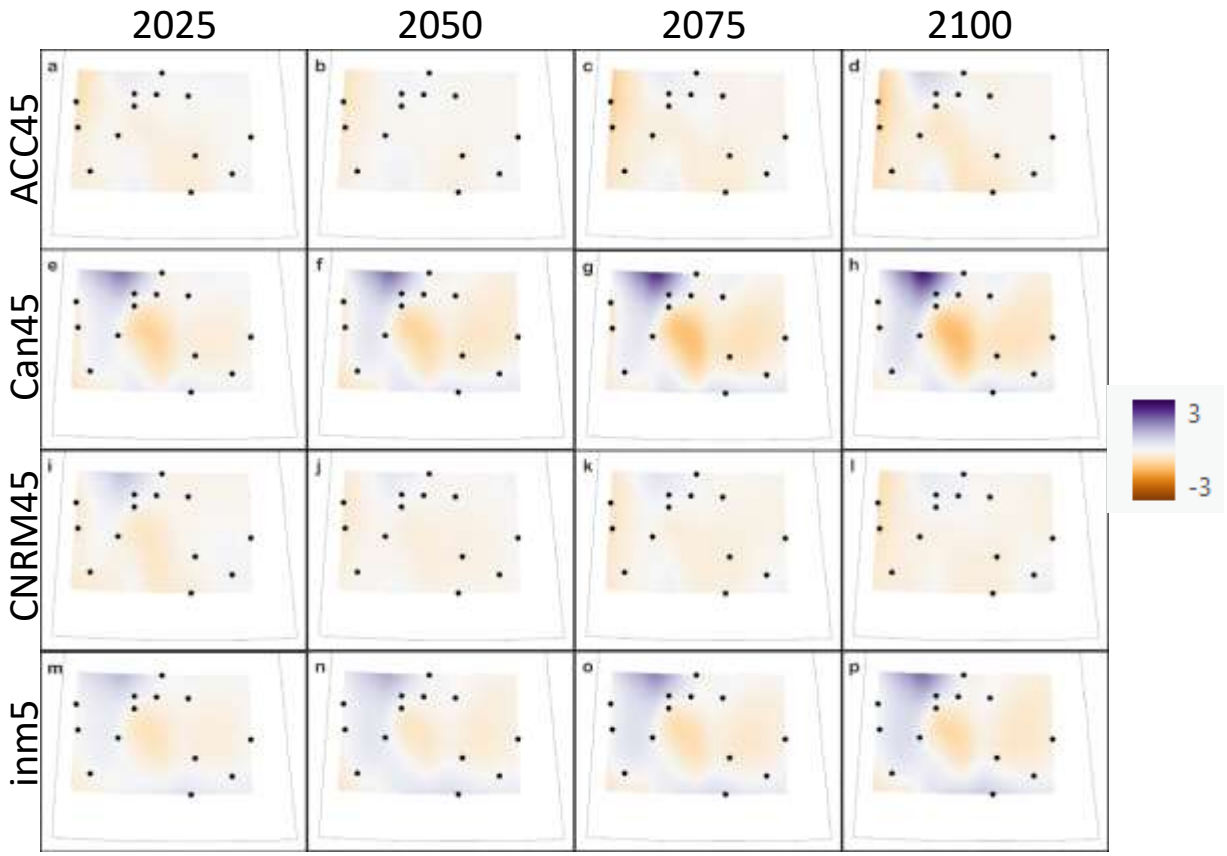




Why is white spruce growth predicted to decline?

- Summer precipitation has a highly positive influence
- Future summer precipitation is predicted to decrease
- Negatively correlated to summer temperatures
- Summer temperatures predicted to increase

Scots Pine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2075
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ACC45
Can45
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inm5
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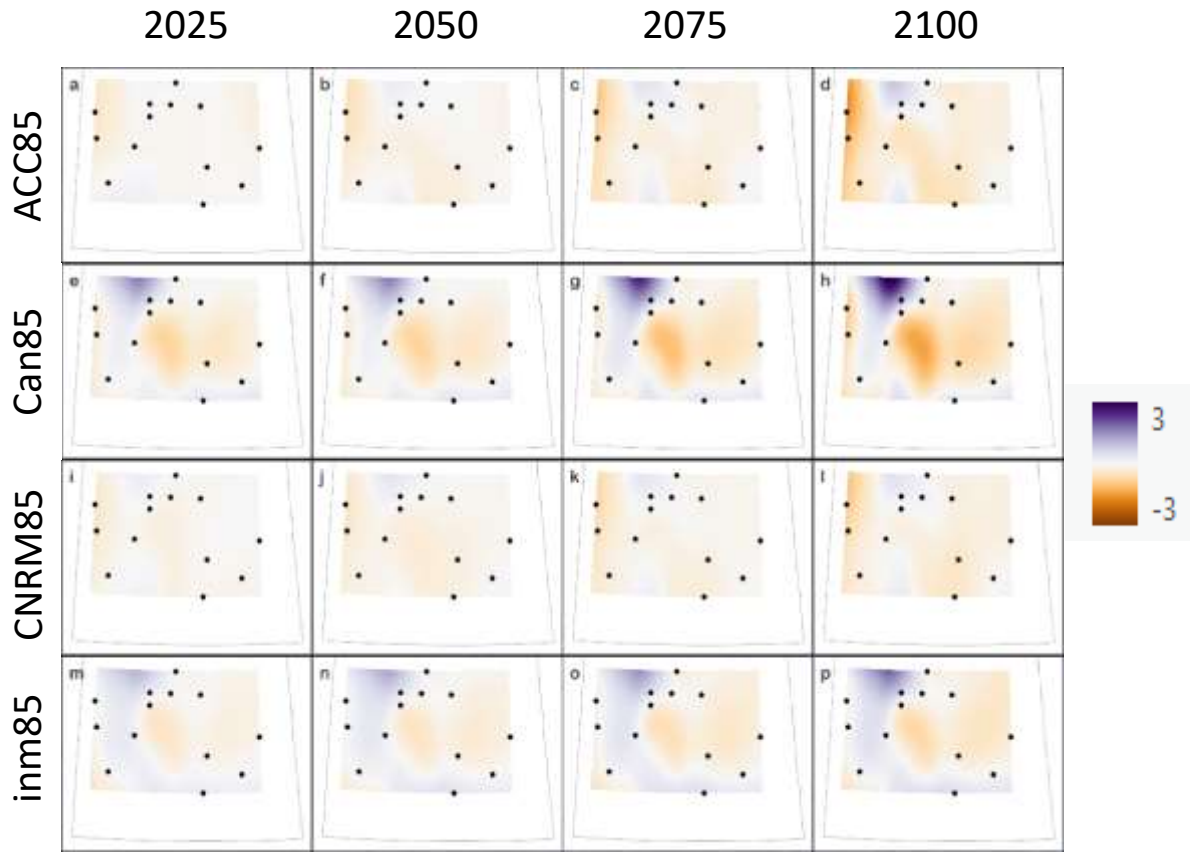
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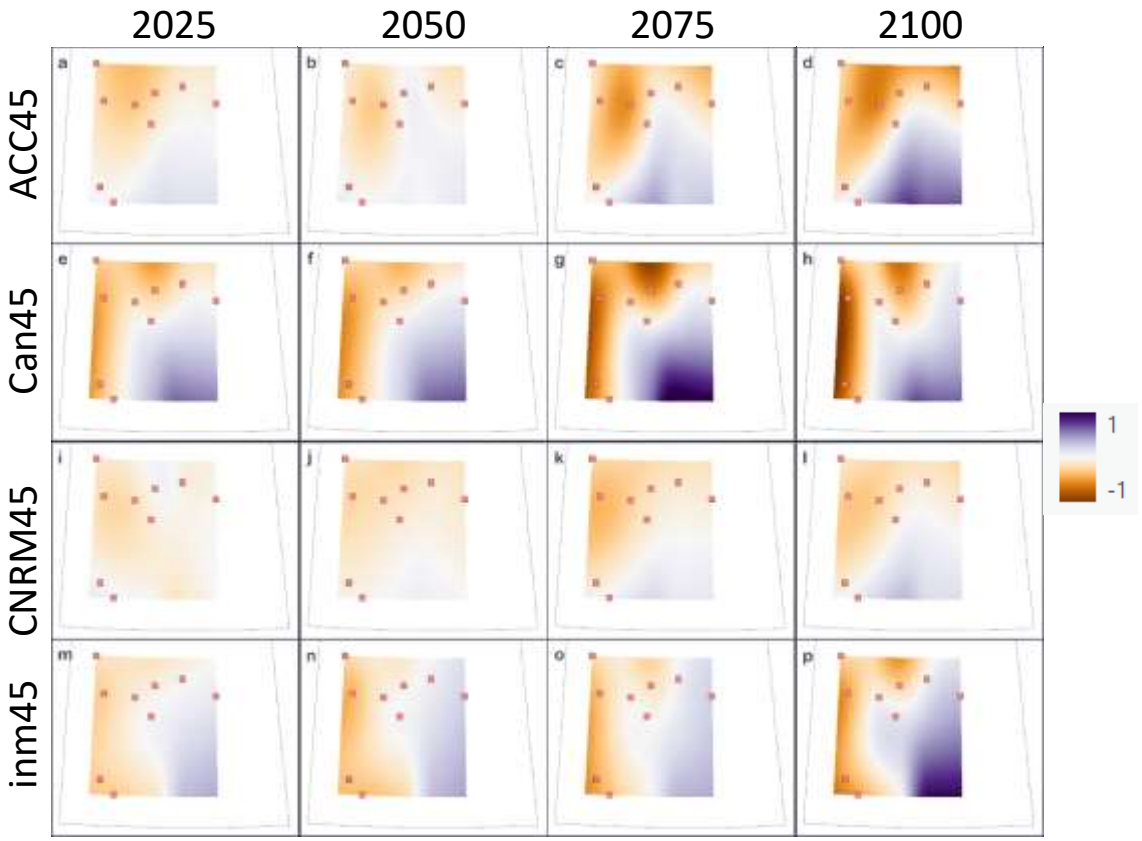
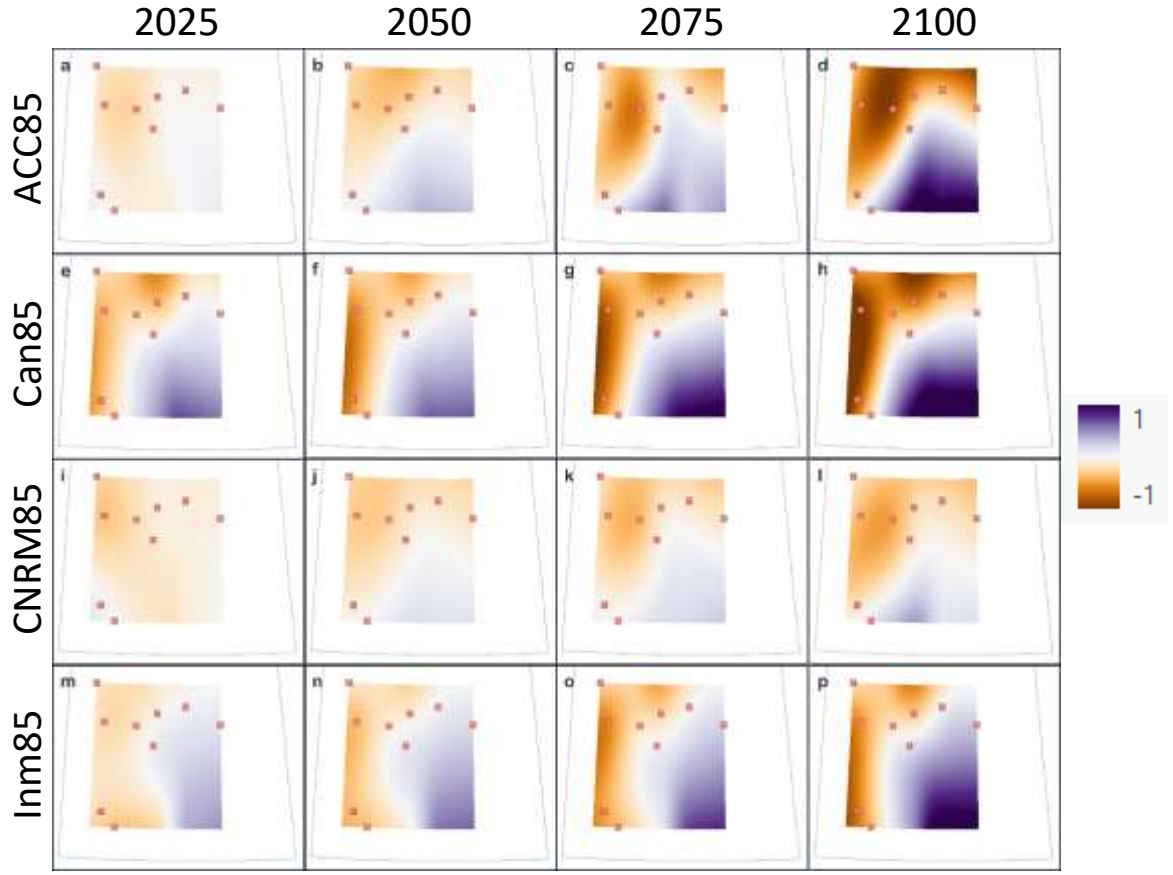
Why is predicted Scots pine growth variable?

- West side positively influenced by spring precipitation
- Spring precipitation is predicted to slightly increase
- East side highly positively influenced by summer precipitation
- Summer precipitation predicted to decline
- Northwest corner positively influenced by spring temperature

Hybrid Poplar

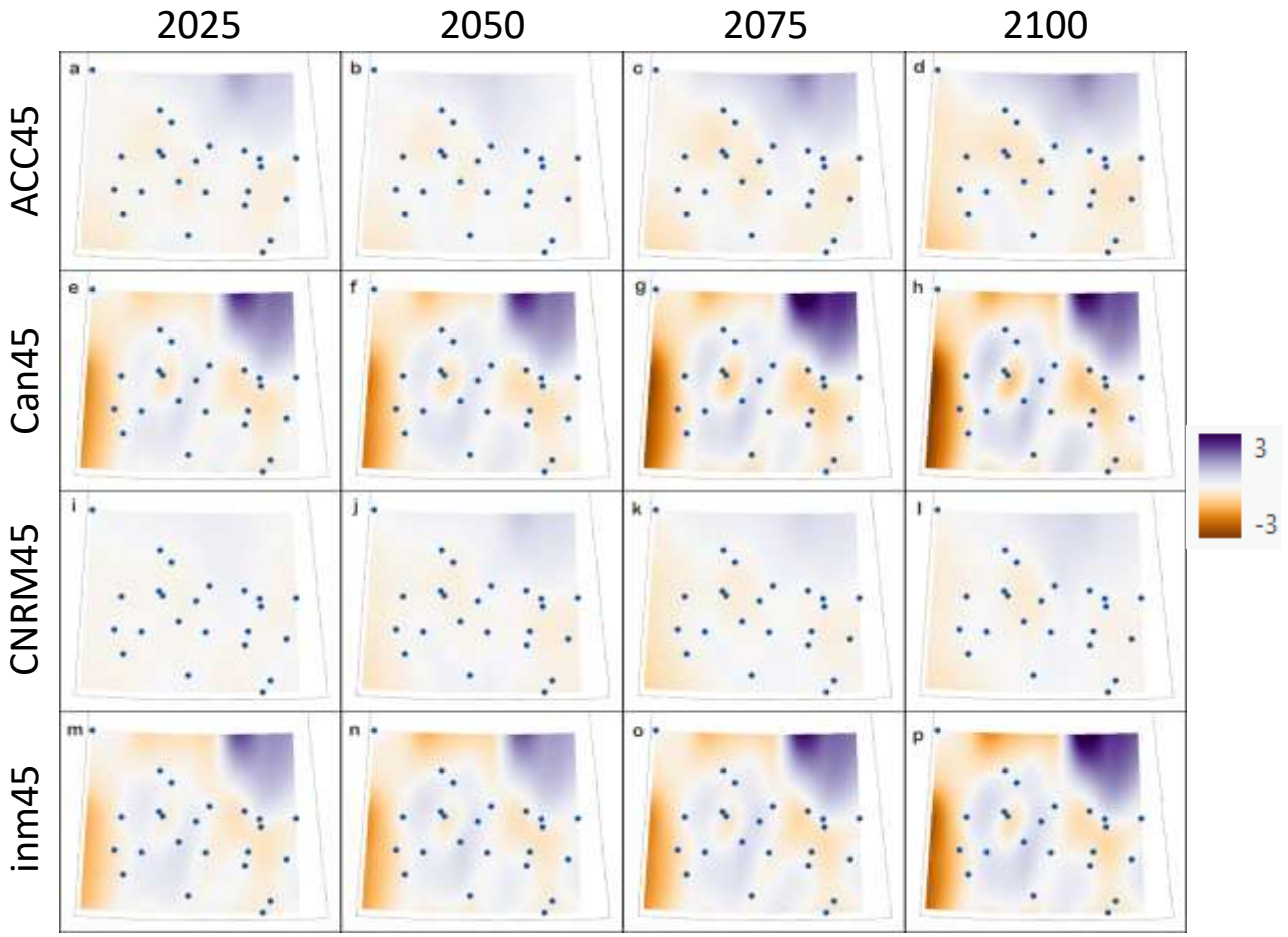




Why are there small changes in predicted hybrid poplar growth?

- West side highly negatively influenced by summer temperature and positively influenced by autumn precipitation
- Summer temperatures predicted to increase, and autumn precipitation predicted to slightly increase

Green Ash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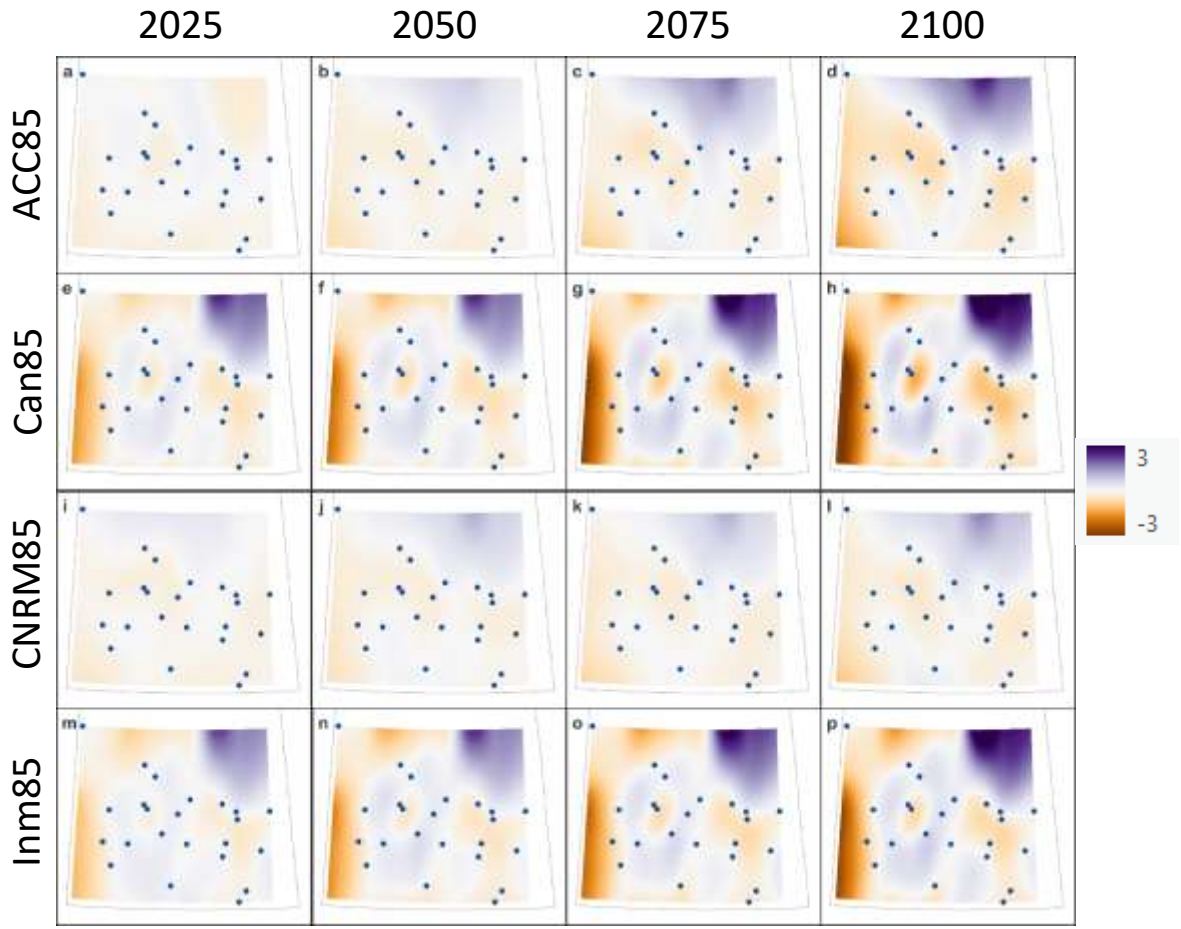
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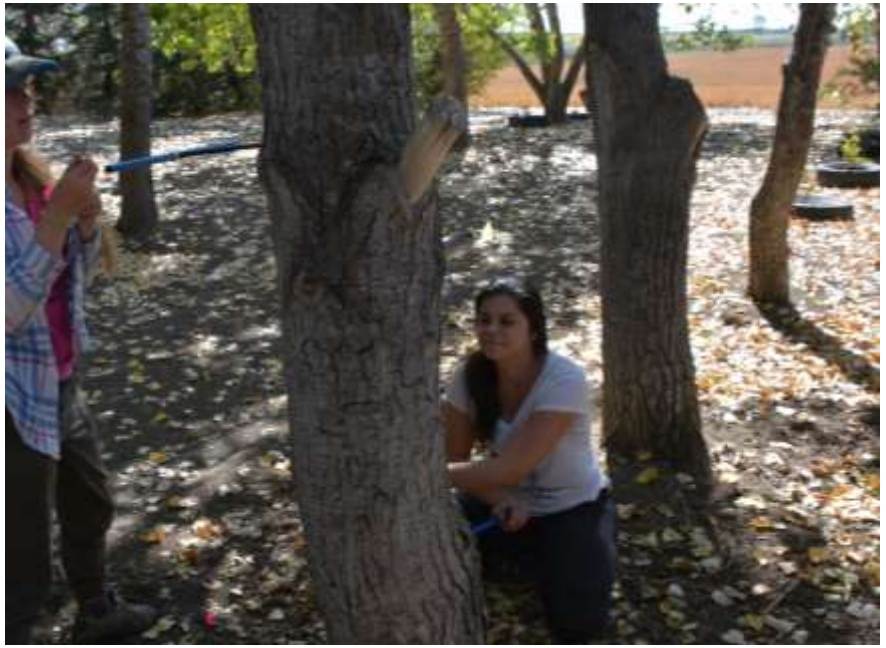
2100
ACC85
Can85
CNRM85
Inm85
3
-3

Why is green ash growth predicted to increase?

- Green ash is more drought tolerant
- Spring precipitation has a highly positive influence in central and north
- Spring precipitation predicted to increase
- Spring temperature negative influence on west side
- Spring temperature predicted to increase

Summary of Results

- Recommend don’t plant white spruce
- Scots pine likely grow well in northwest
- Hybrid poplar predicted to decrease in west-but minimal changes
- Green ash shows promise as a good species to plant
- Plant shelterbelts – good strategy to protect farm against climate change!



Questions?