Transformation of Sitka spruce stands to Continuous Cover Forestry (CCF): Investigating light-driven responses of underplanted saplings.

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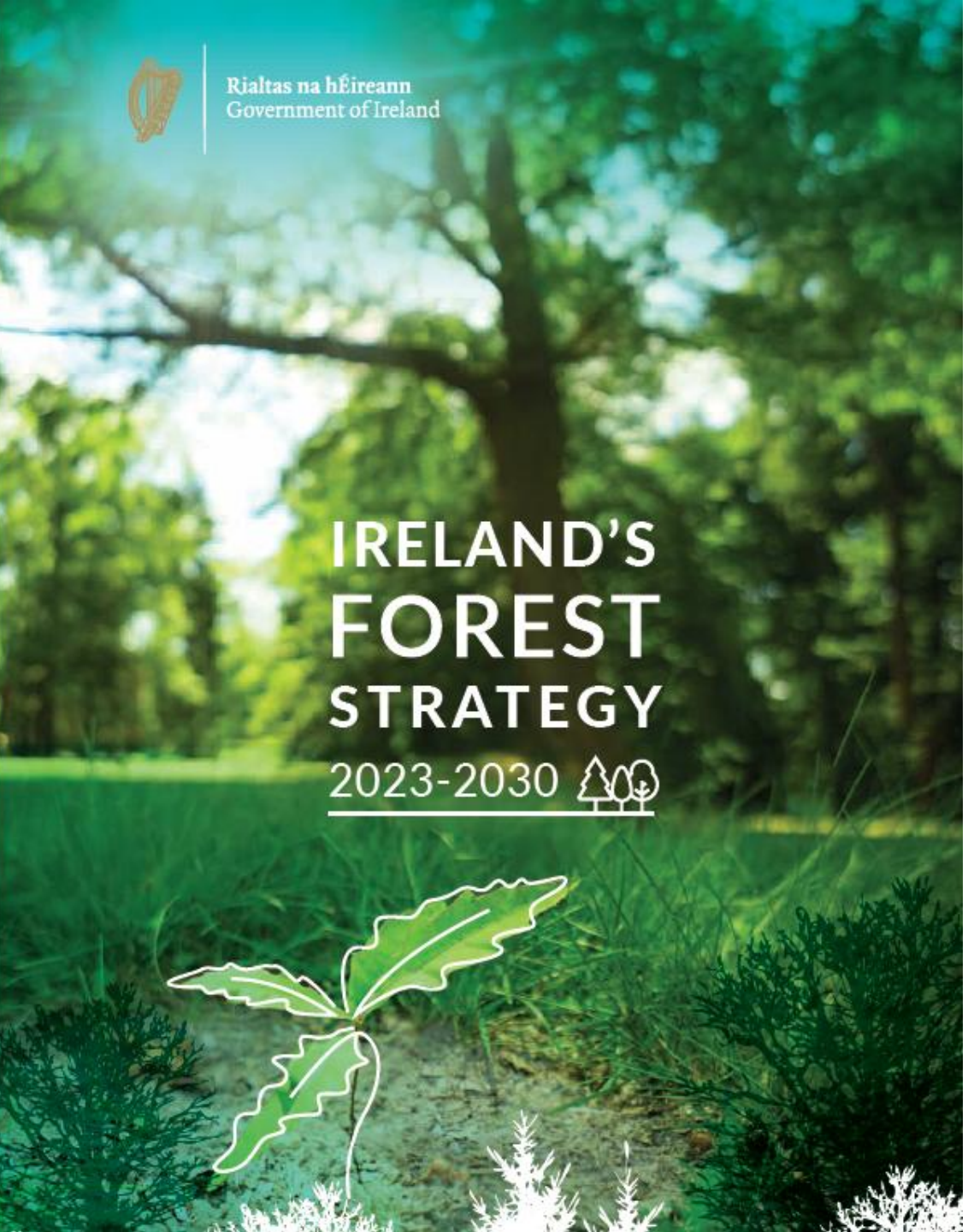
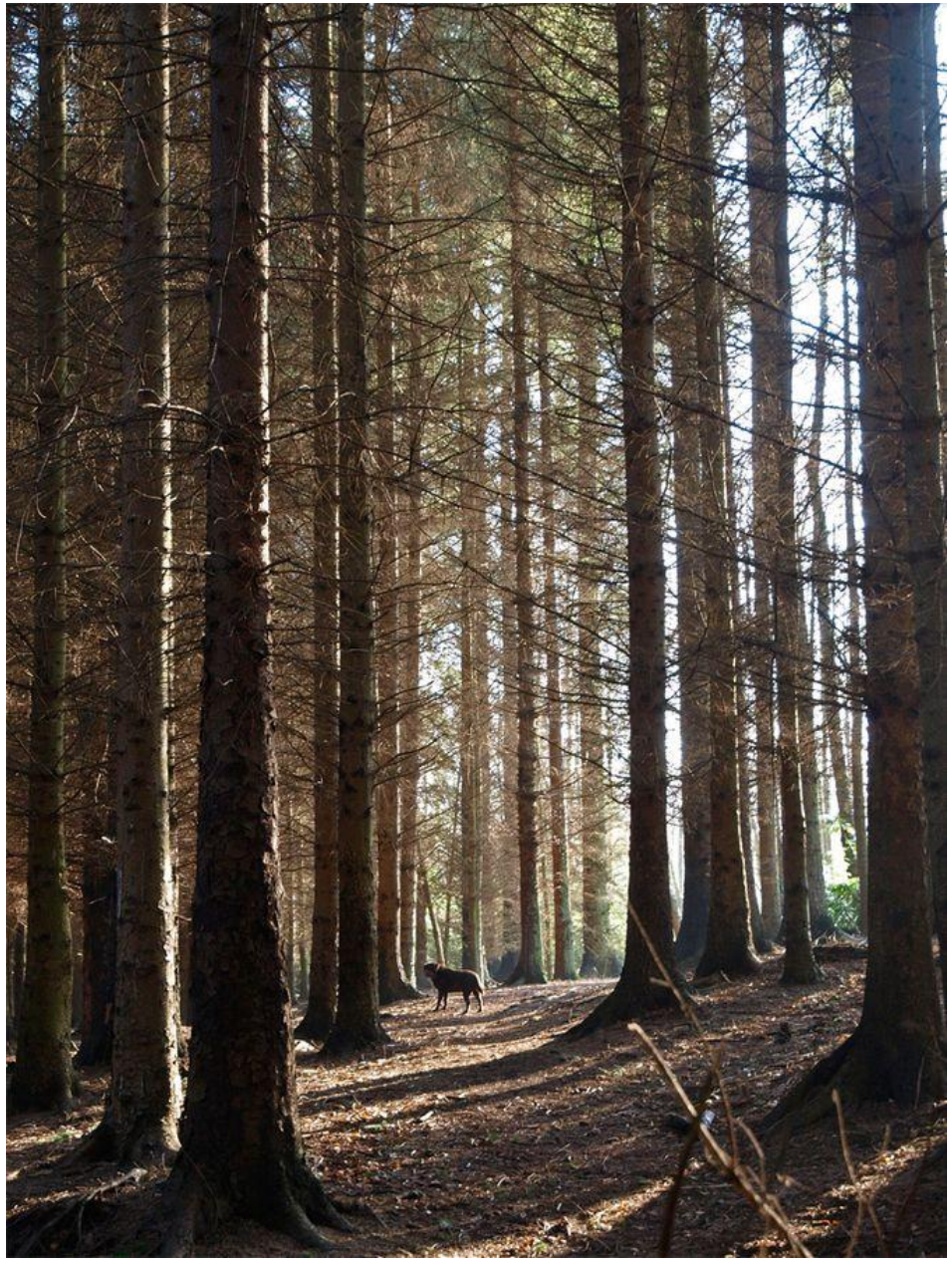
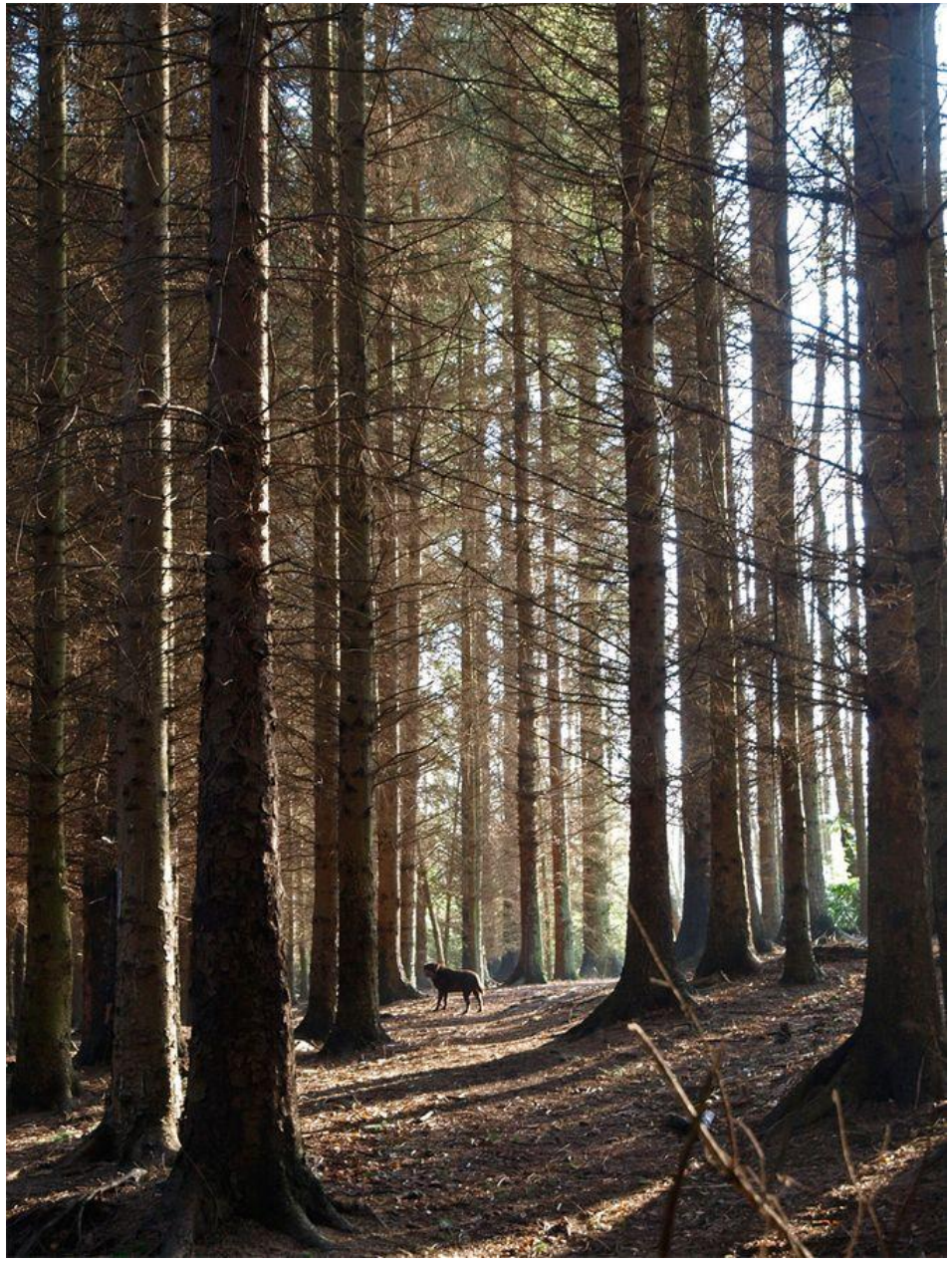


- Expand national forest cover to 18%.
- Deliver benefits for climate change, biodiversity, water quality, wood production, economic development, employment and quality of life.
- Emphasis on the use of **low- impact silvicultural systems.**
- In the past: focus on commercial forestry.
- In the future: a multifunctional forest estate.

- Need information on continuous cover forestry (CCF) in Ireland;
  - *what we plant.*
  - *where we plant.*
  - *what impact is it going to have.*





Continuous Cover Forestry (CCF)

CCF challenges

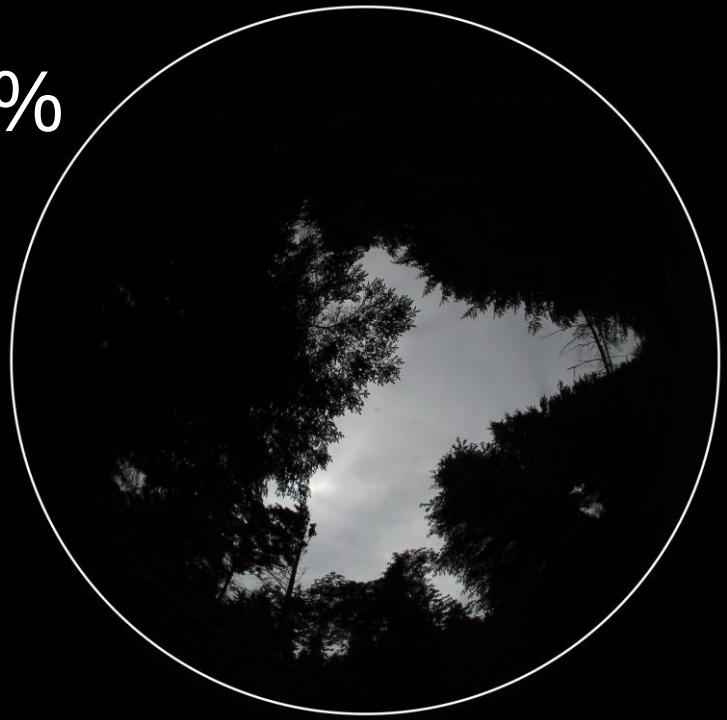
- Forests typically restock through natural regeneration.
- Issue: seed input.
- Issue: deer browsing.
- New saplings introduced through underplanting.
- Question: what level of canopy openness is needed for the survival growth of different species.

Study aim

1. Experiment in collaboration with Coillte.
2. 2 sites in Dublin mountains.
3. Sitka spruce stands managed under CCF, with gaps of different sizes.
4. Deer browsing is an issue at both sites.
5. **Study aim:** Assess how canopy openness influences the growth, health, and adaptation of underplanted tree species with varying shade tolerances.

3%

15%



28%

37%

Underplanted Tree Species

Oak

Quercus petraea

Douglas fir

Pseudotsuga menziesii

Beech

Fagus sylvatica

Western red cedar

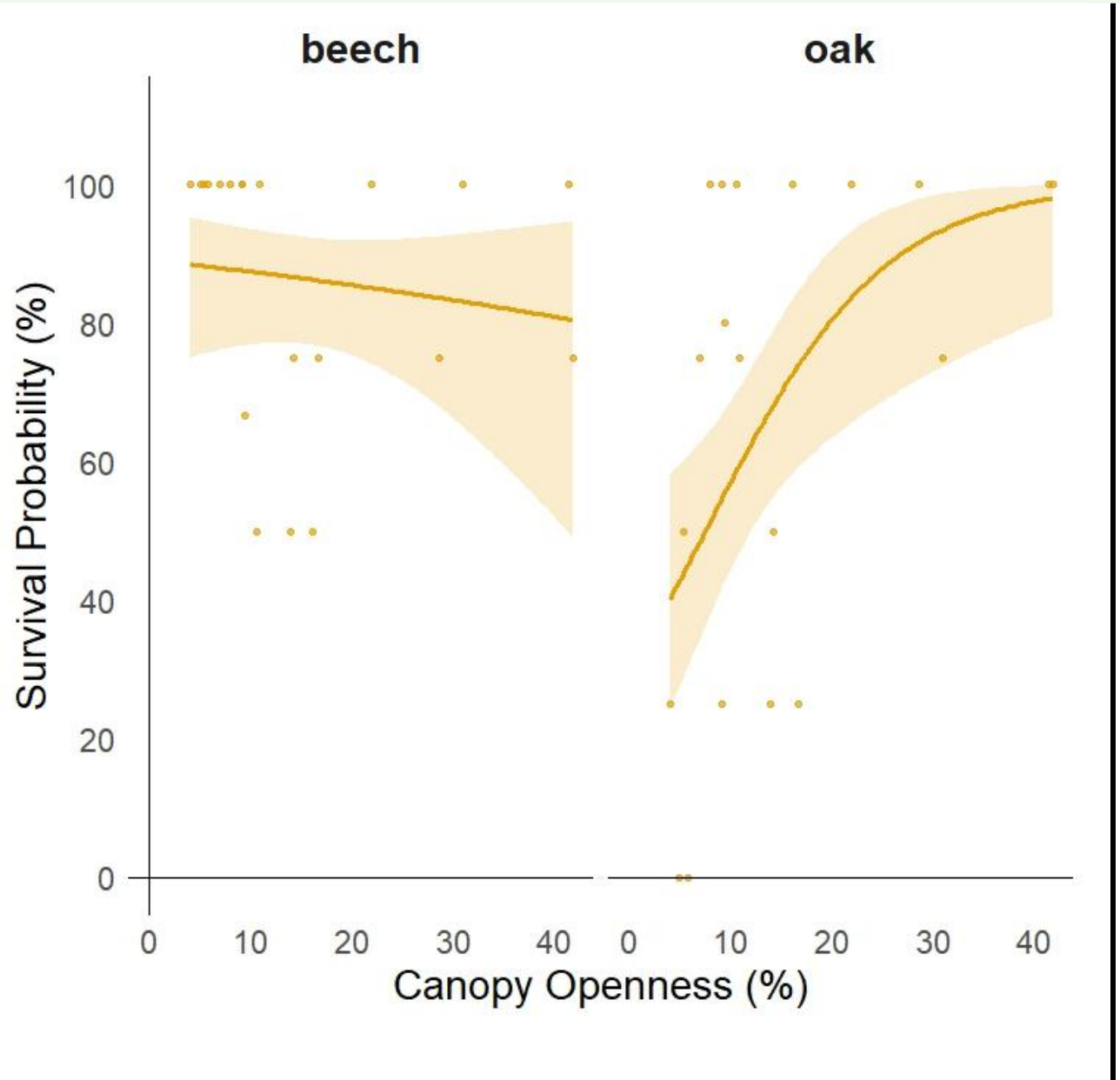
Thuja plicata

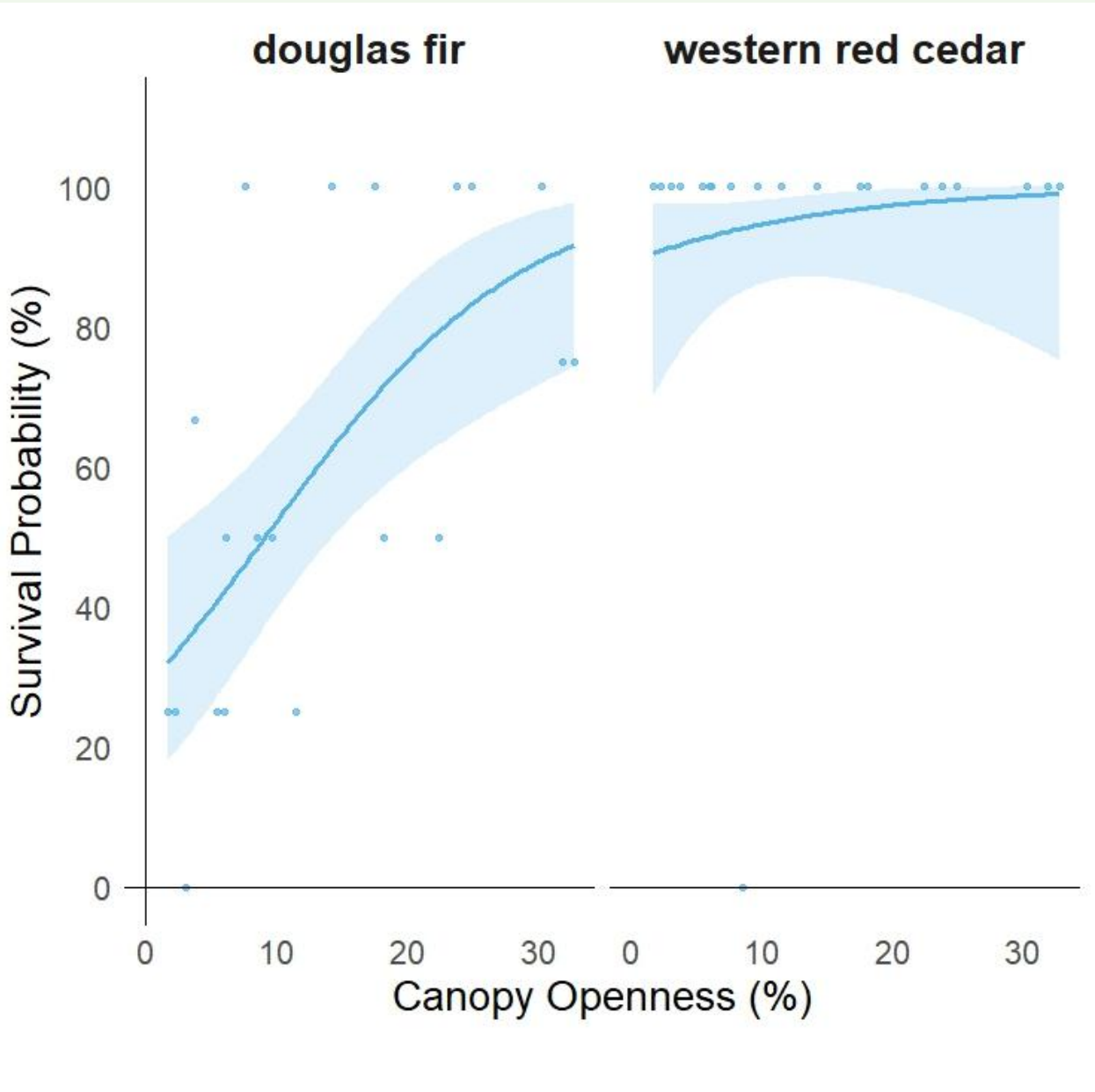
Increasing shade tolerance

Variables collected

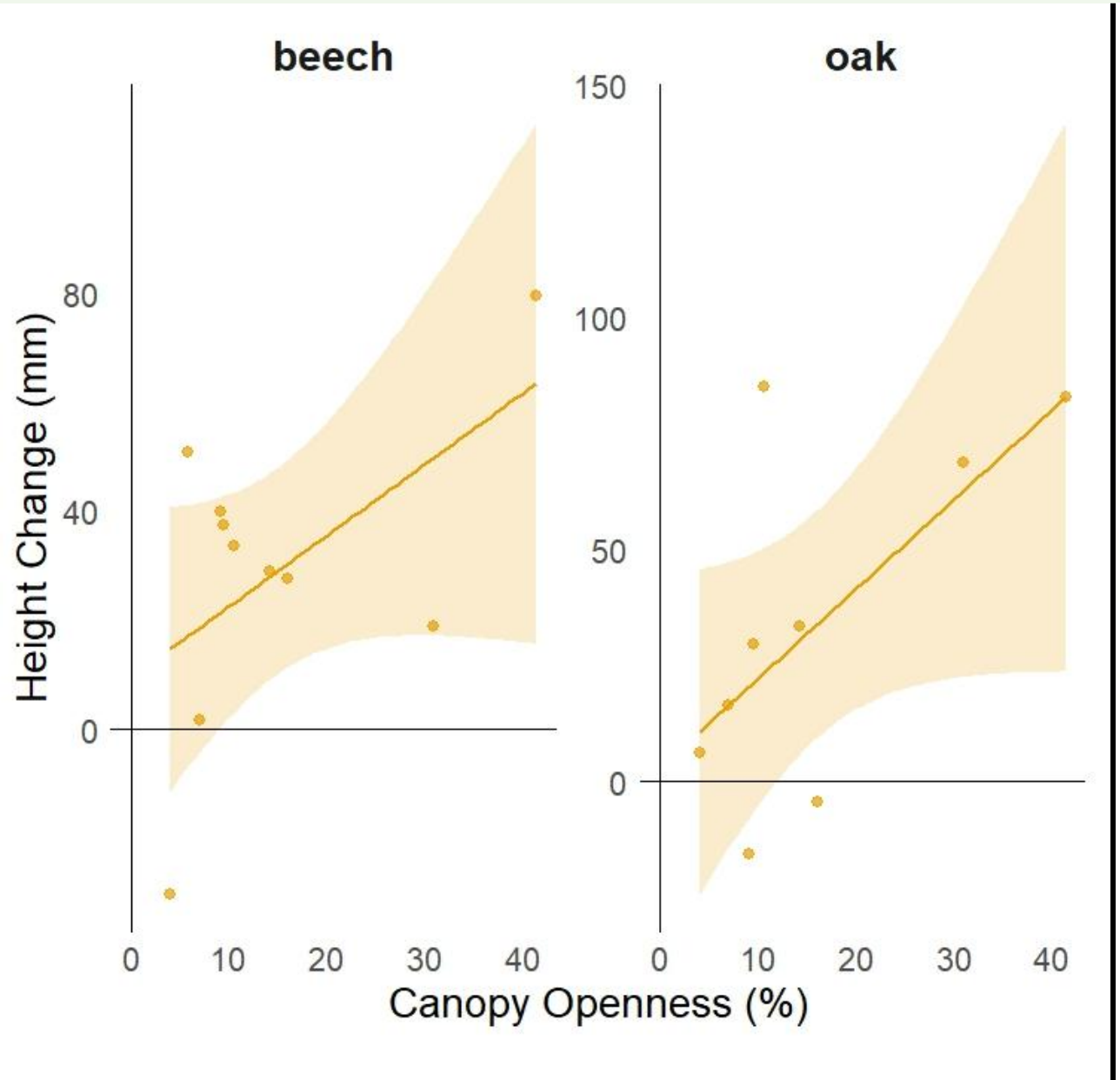
- Soil data
- Site exposure
- Canopy openness
- Deer browse
- Chlorophyll fluorescence
- Leaf chlorophyll and carotenoid content
- Leaf thickness
- Specific leaf Area
- Sapling root collar diameter
- Sapling height
- Sapling survival

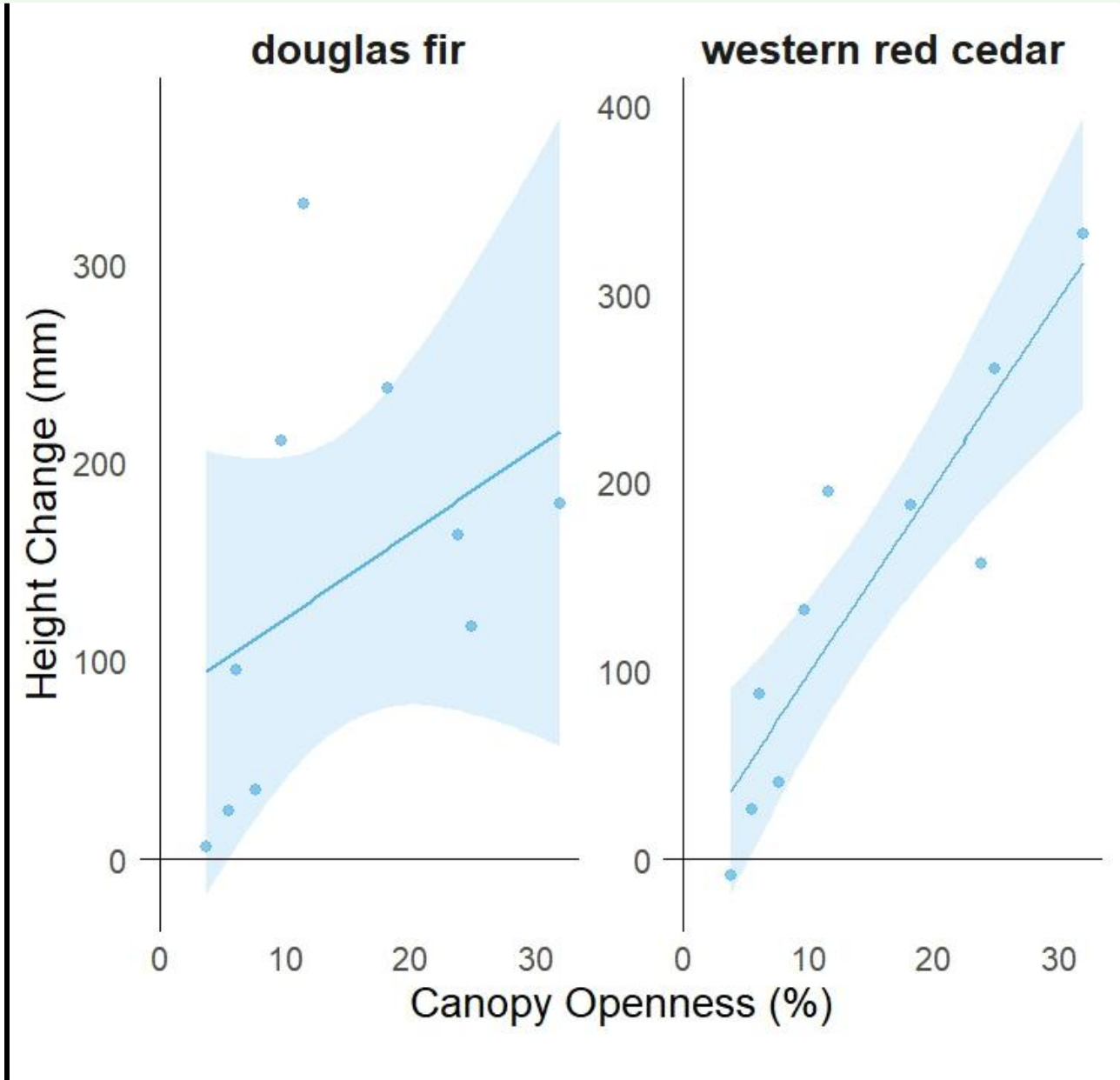
Survival


beech
oak
Survival Probability (%)
100
80
60
40
20
0
0
10
20
30
40
Canopy Openness (%)

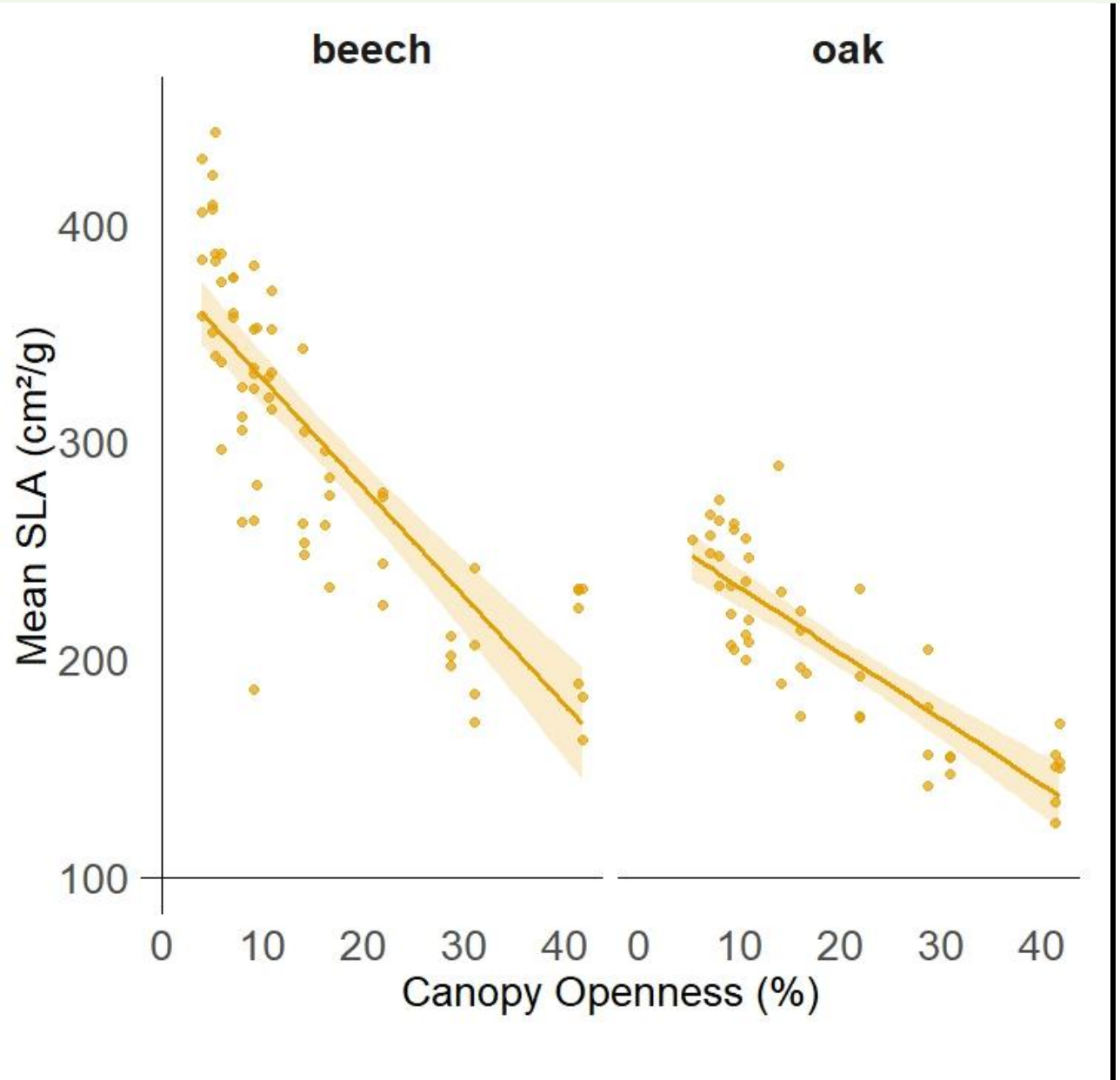

douglas fir
western red cedar
Survival Probability (%)
100
80
60
40
20
0
0
10
20
30
Canopy Openness (%)

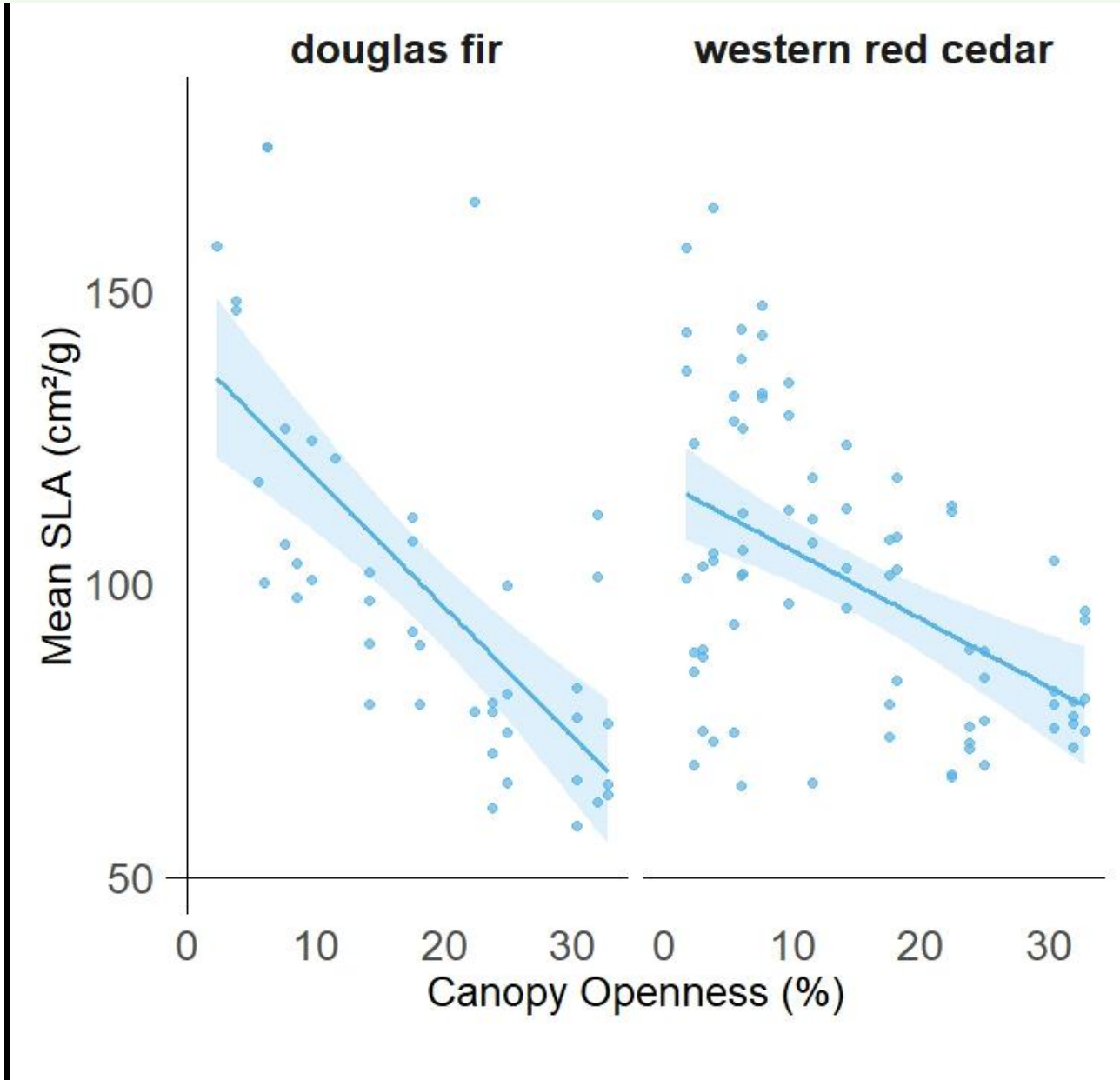
Height change



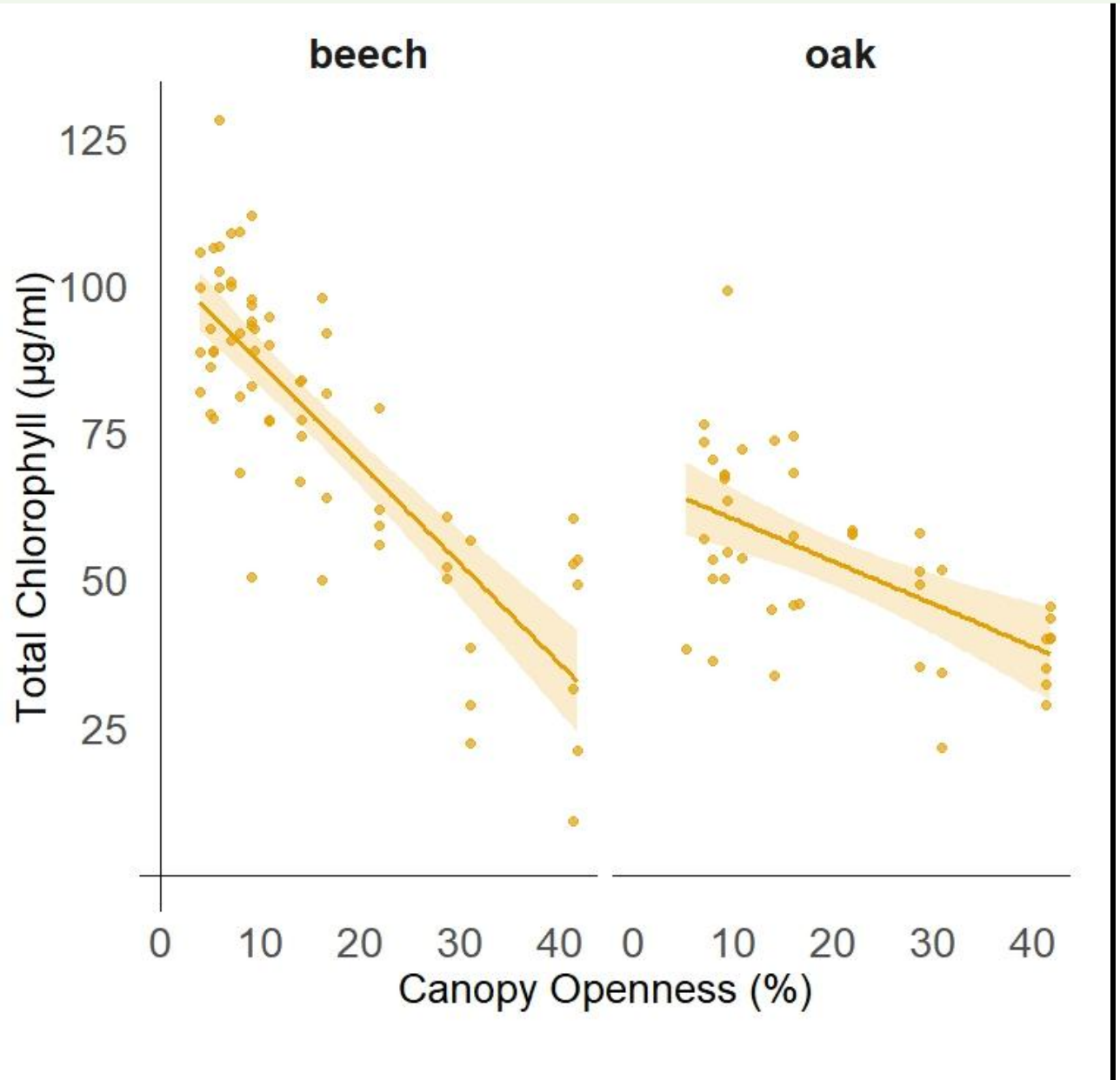


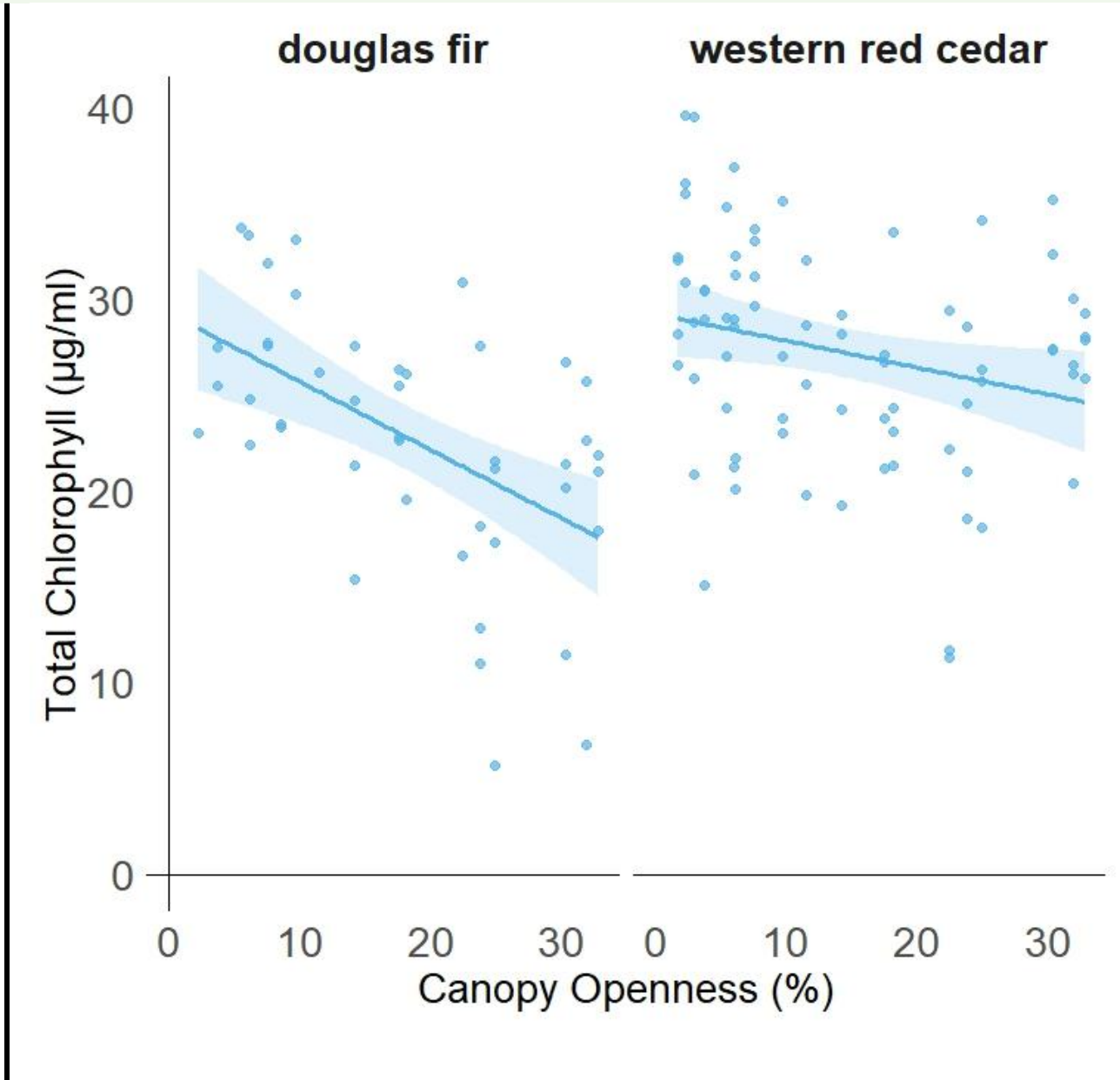
Specific Leaf Area





Total Chlorophyll





TAKE HOME MESSSAGE

Results will help inform underplanting strategies in sitka spruce stands managed under CCF.

1. Saplings exhibited species-dependent morphological and physiological responses to the light environment.
2. Light-demanding species showed high survival when canopy openness exceeded 20%.
3. Low growth rates under low canopy openness, but saplings may respond to further thinning interventions.

Acknowledgements

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