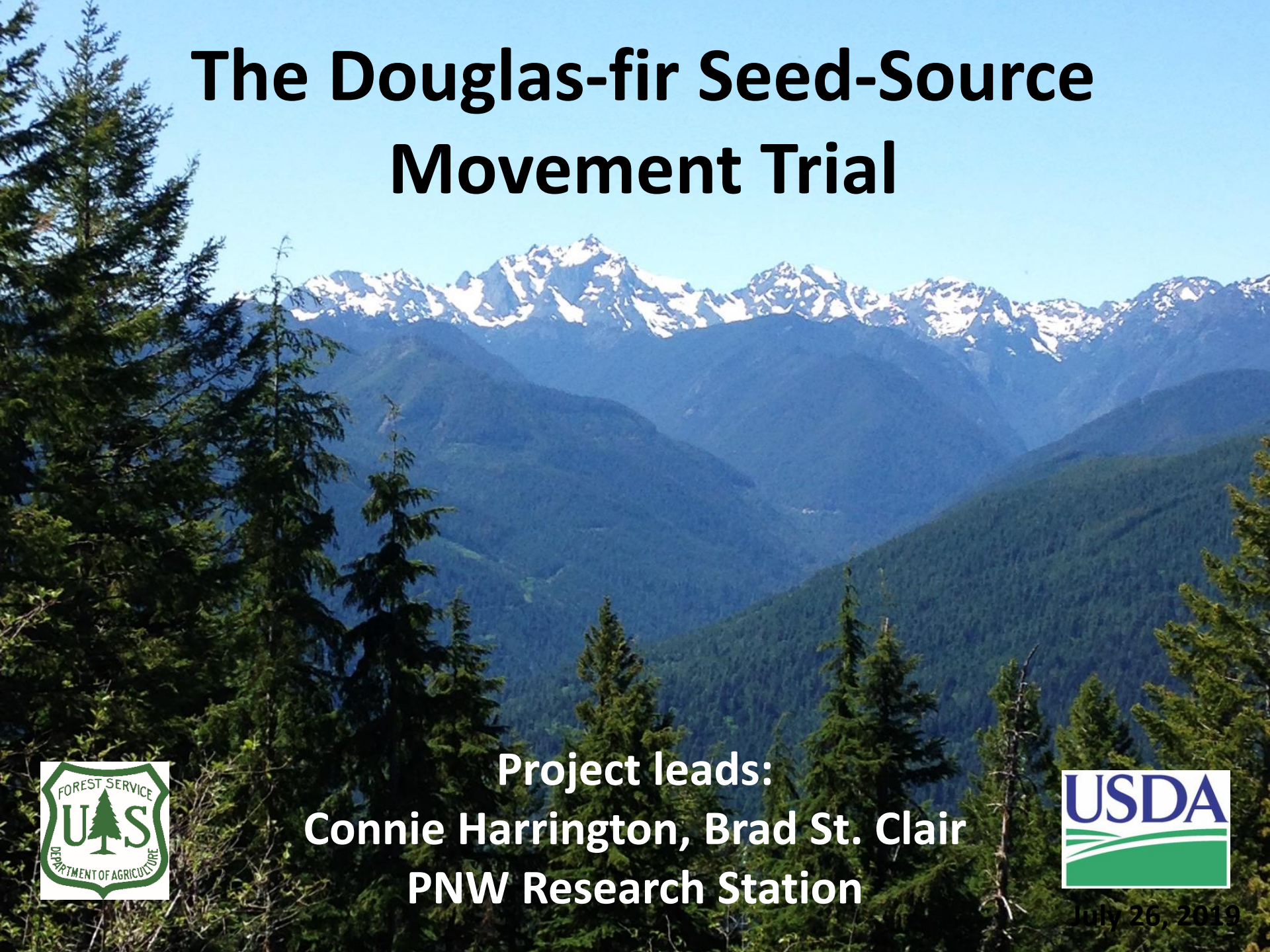
The Douglas-fir Seed-Source Movement Trial



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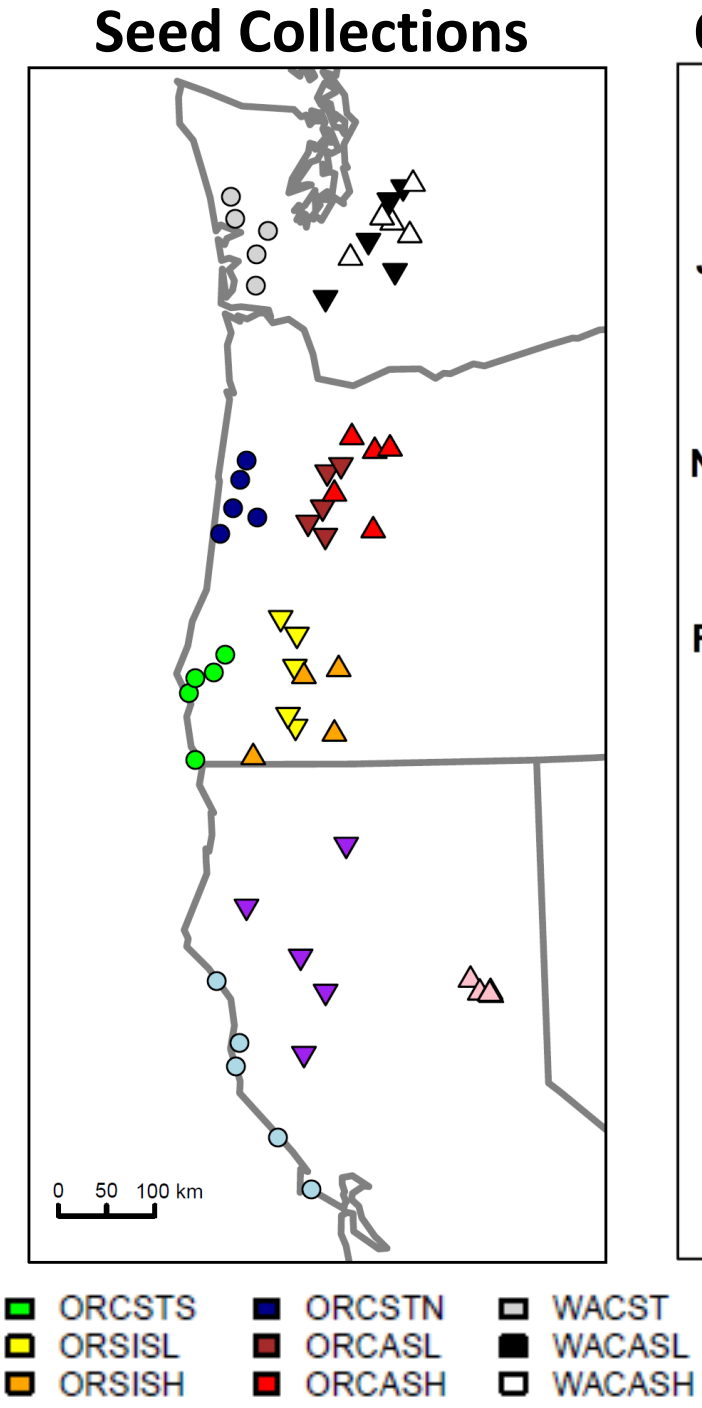
Why Douglas-fir?

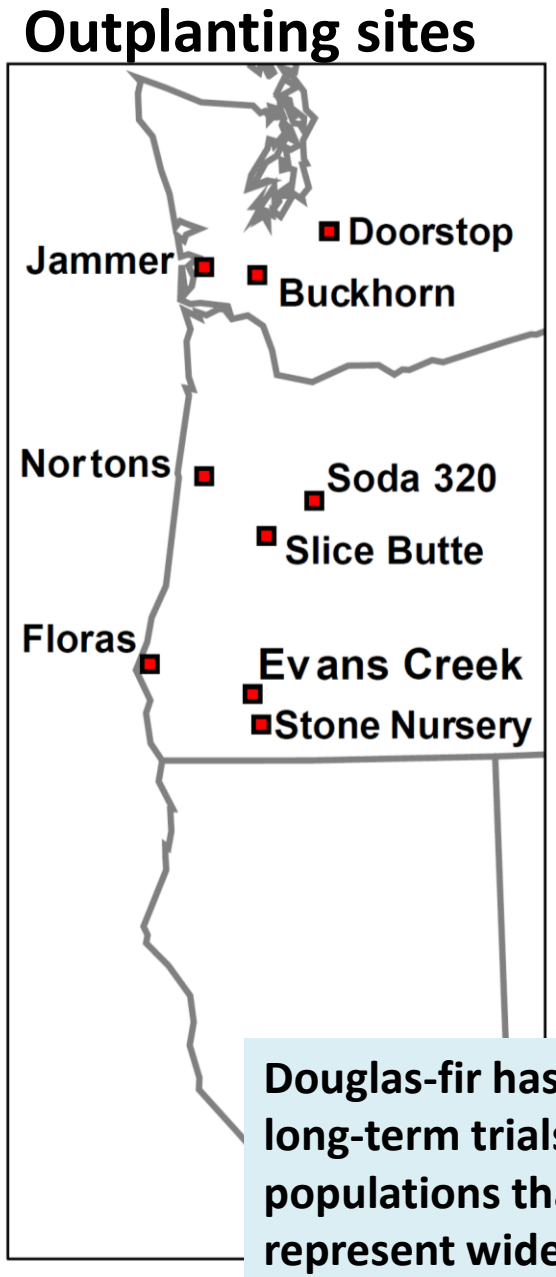
Ecological & Economic King in western WA and OR

Great Western Lumber

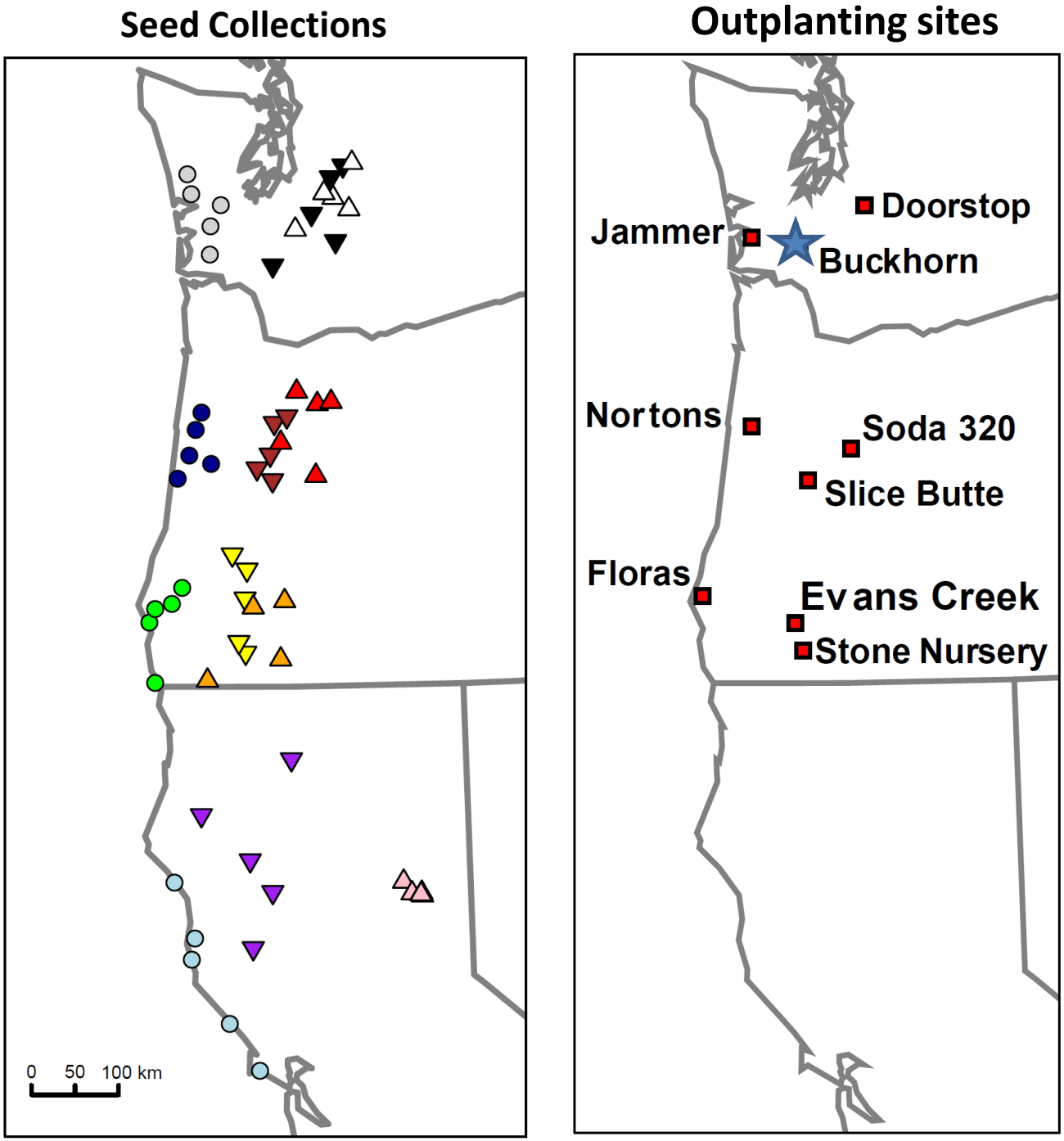
Spi-ind.com

Locations where seed was collected – 12 Regions; 5 locations per region, 2 trees per location = 120 families



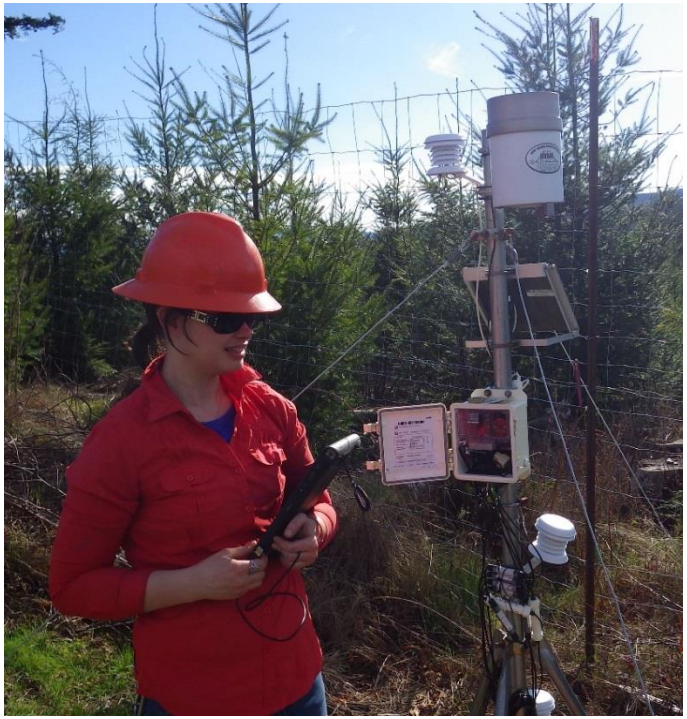


Douglas-fir hasn't had long-term trials with populations that represent wide range of climates

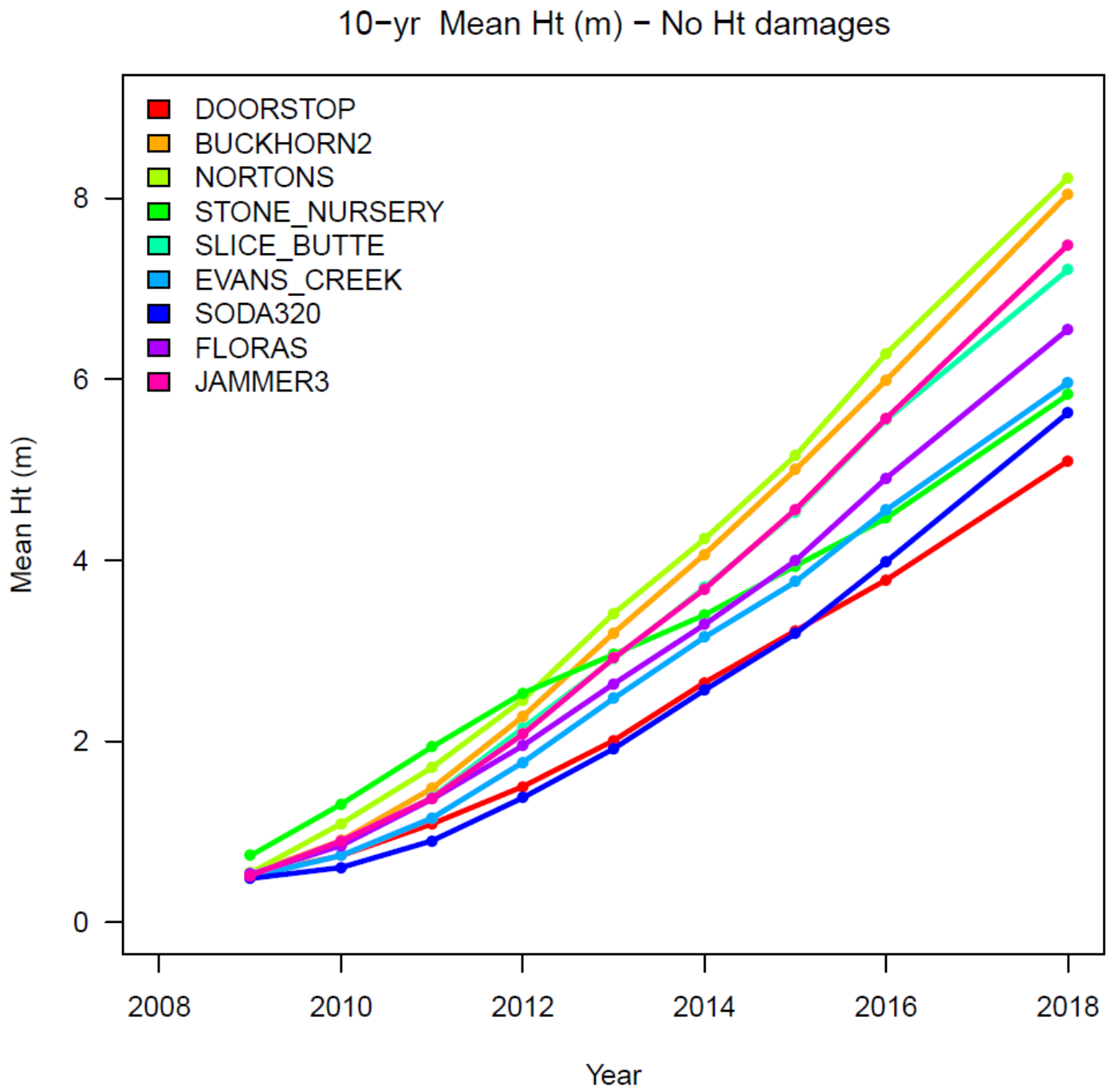

Seed Collections
Outplanting sites
Doorstop
Jammer
Buckhorn
Nortons
Soda 320
Slice Butte
Floras
Evans Creek
Stone Nursery
0 50 100 km

SSMT data collected 2009-2019

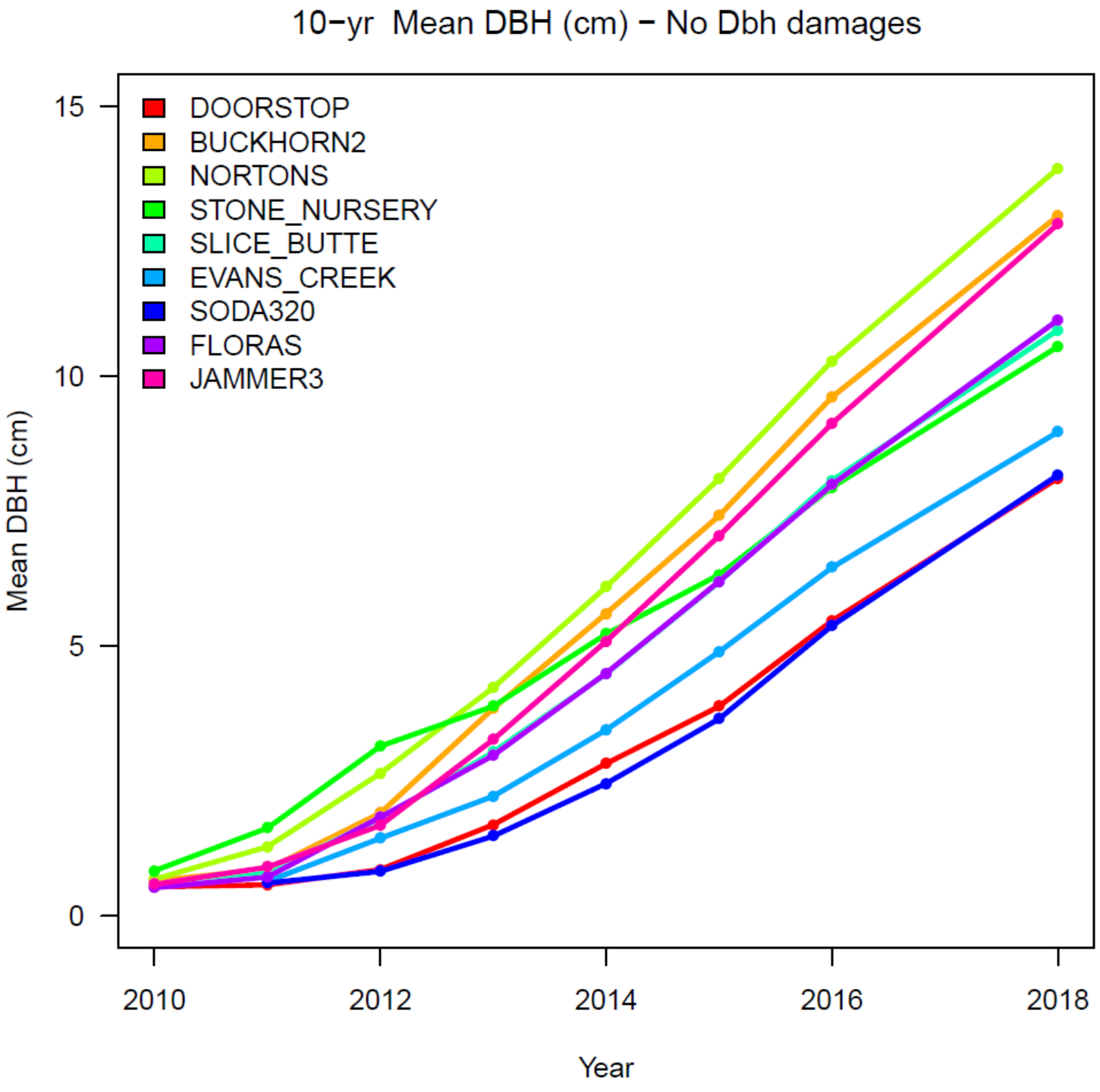
Tree height, diameter, survival, condition (all study trees, all years)
Timing of spring budburst (all study trees - few years, more trees - fewer years)
Timing of diameter growth using dendrometers (3 regions/3 sites, multiple years)
Timing of height growth (some sites and years, used time lapse cameras 1 year)
Foliage diseases (all study trees, all sites, 1 year)
Air temperature, soil temperature, precipitation, etc.



Hobo weather stations at Seed Source Movement Trail sites

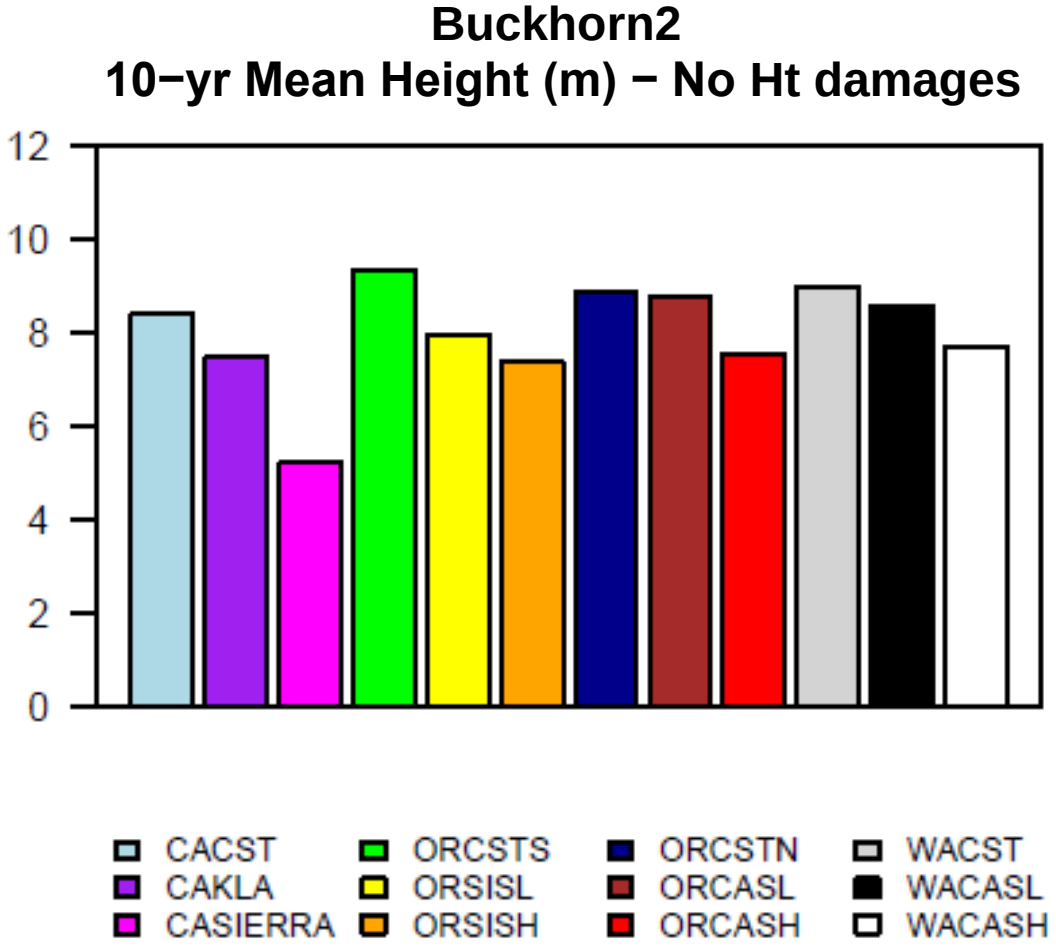


Planted Fall 2008/Spring 2009



Planted Fall 2008 or spring 2009

Metric Hint
7.5 cm ~ 3 in

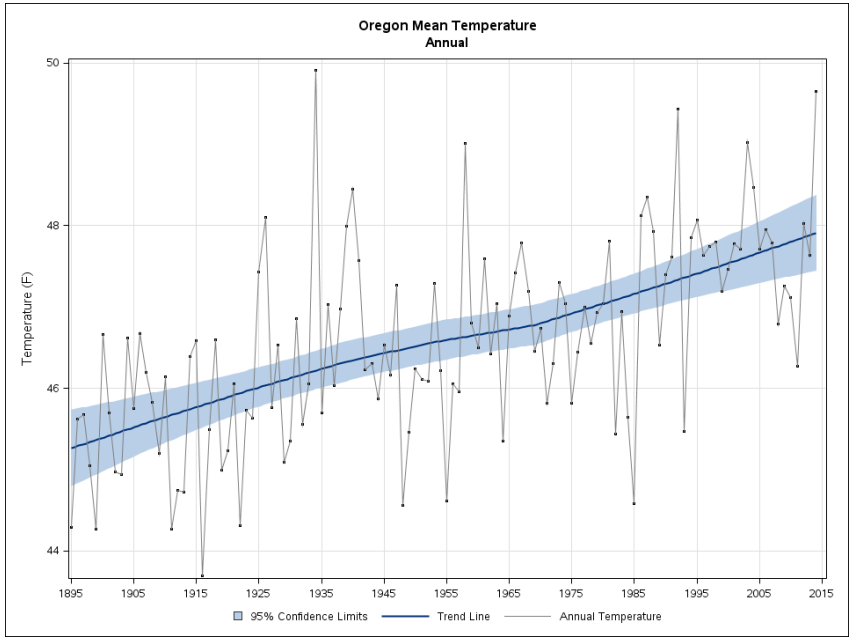

Buckhorn2
10−yr Mean Height (m) − No Ht damages
12
10
8
6
4
2
0
CACST
CAKLA
CASIERRA
ORCSTS
ORSISL
ORSISH
ORCSTN
ORCASL
ORCASH
WACST
WACASL
WACASH

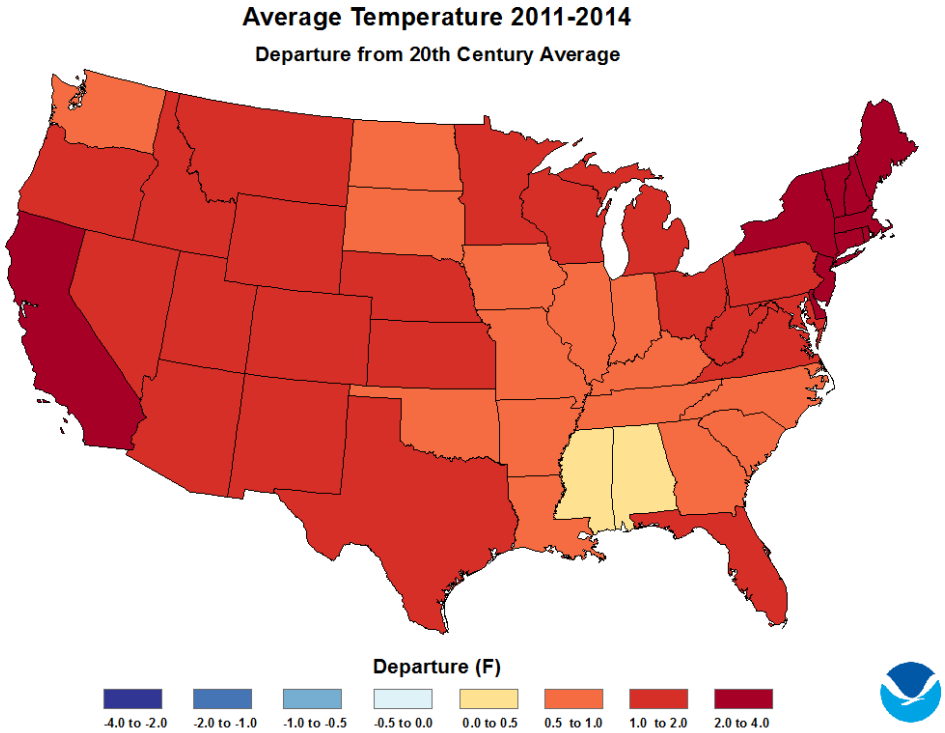

Can we predict yearly height or diameter growth based on temperature, precipitation, and seed source?

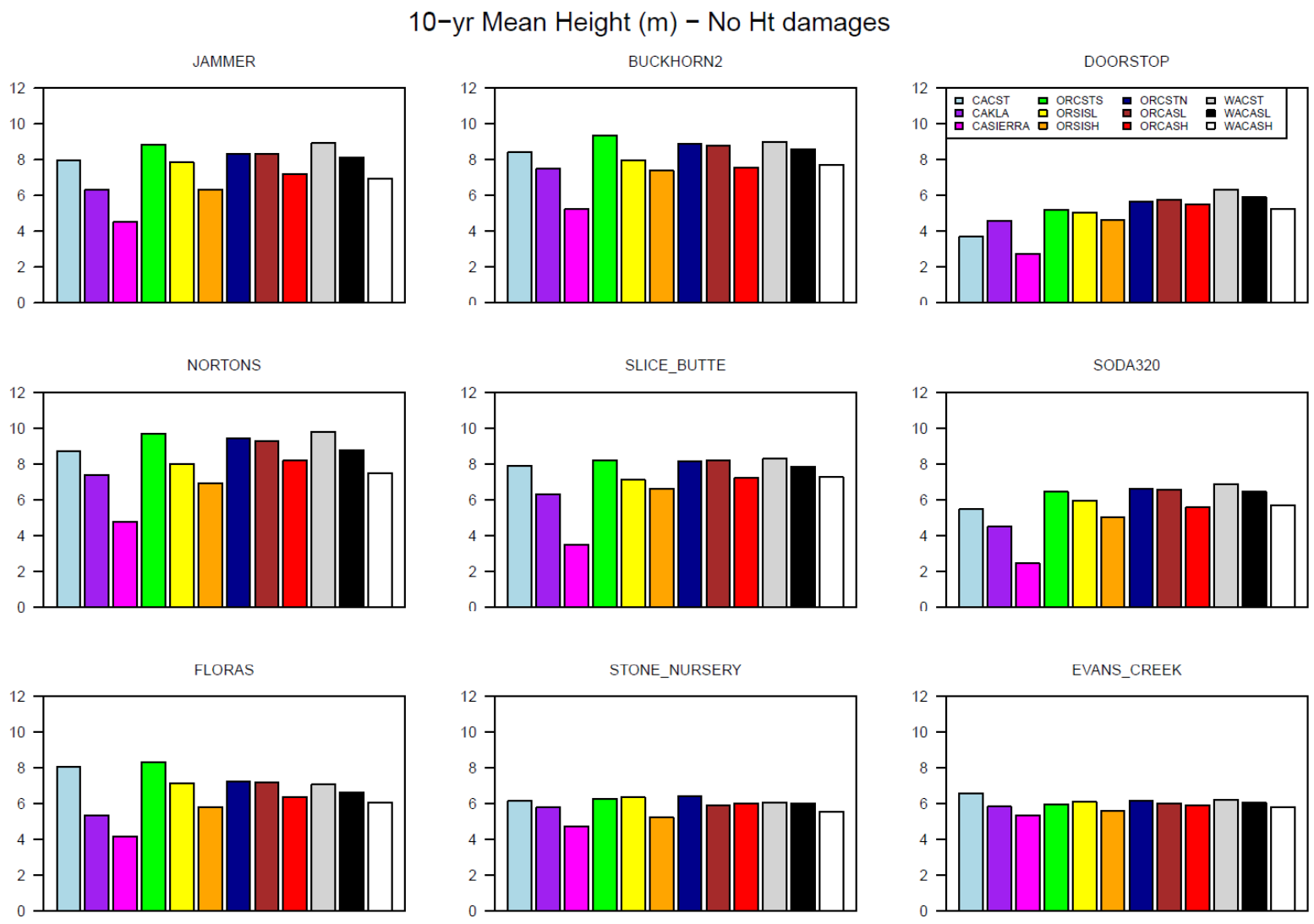
Importance

- Managers want to accurately predict timber growth and yield over shorter as well as longer timeframes

- Understanding the **environmental and genetic cues** that affect growth will help us predict changes, and manage for more desirable/adaptable trees in the future

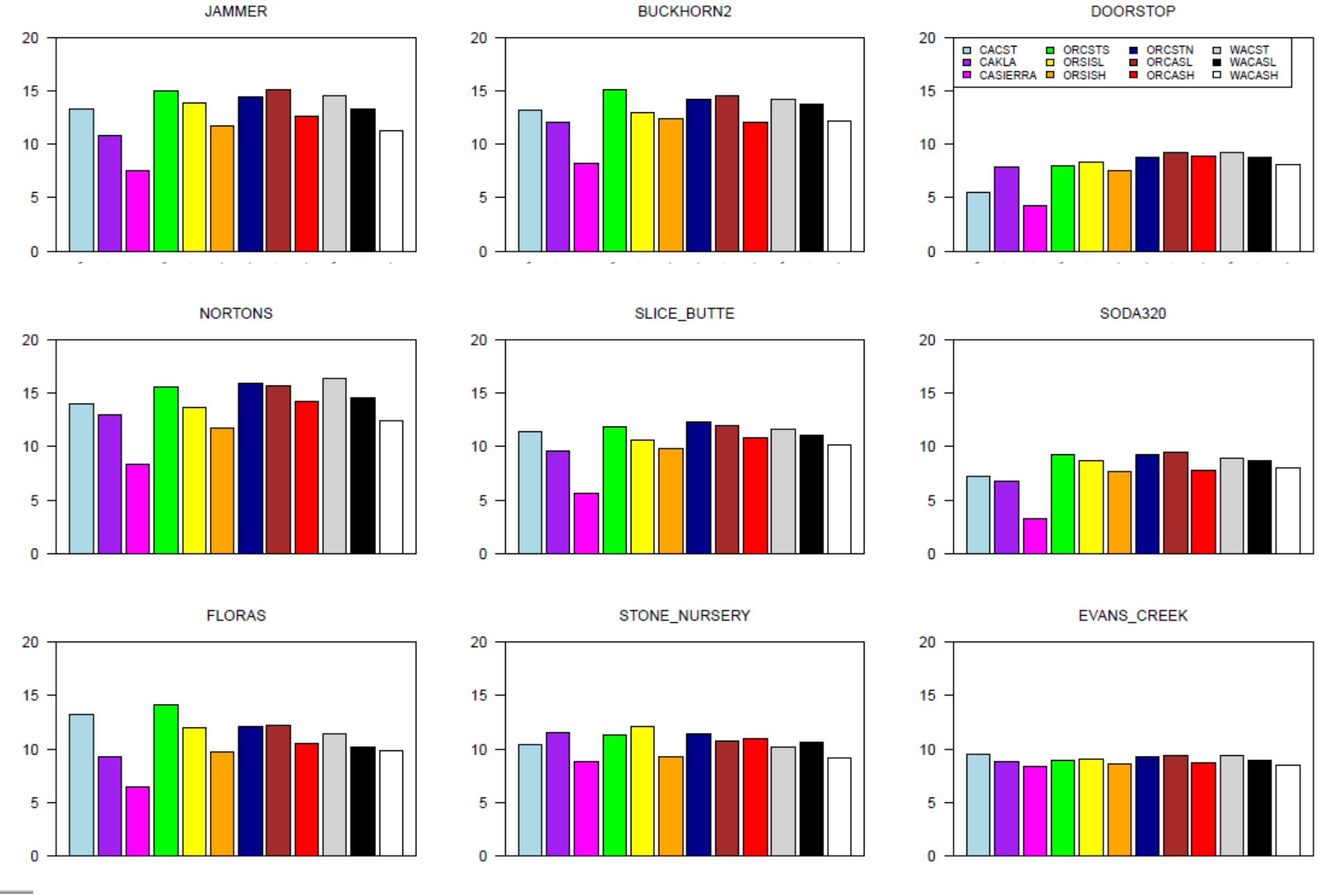






Metric hint 5 m = 16.4 ft, 8 m = 26.2 ft

10−yr Mean DBH (cm) − No Dbh damages

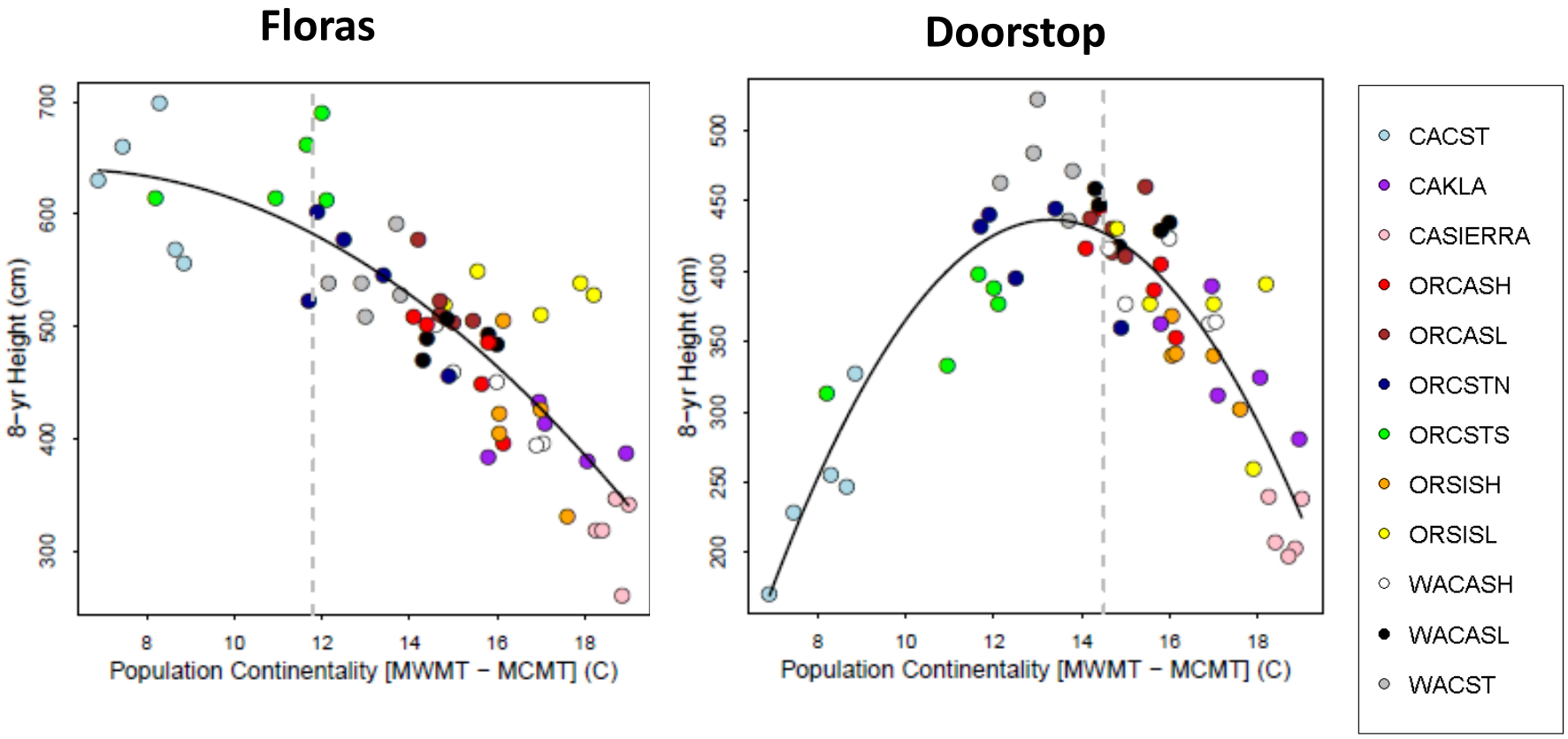


Metric Hint 10 cm ~ 4 in

Year 8 Growth Modeling

- **Evaluated using Universal Response Function (URF) approach (Wang et al. 2010)**
  - **Growth modeled as a function of climate of the seed source (where it evolved) and the climate of the test site (where it is growing)**
  - **The single best variable (highest R^2) for the seed source climate was continentality (summer minus winter temperature)**
  - **The single best variable (highest R^2) for the test site climate was climate moisture deficit (measure of aridity)**

8-year height at Floras and Doorstop as a function of seed source continentality



Dotted line indicates continentality at each test site (i.e. local climate); movement away from line indicates response from moving populations away from local climate (i.e., transfer function)