Adapting Tree Species Composition in a Changing Climate – A Planting Trial for Forest Resilience

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Ecosystem Resilience

-ability to *maintain* or *recover* ecological *functions* following a *disturbance*
Forest Productivity and Recovery of Ecological Functions
Landscape Perspective of the Cedar River Municipal Watershed – Habitat Conservation Plan and Biological Reserve
Canopy tree and understory mortality in dry Douglas-fir forests
Adapting to Changing Climate and Disturbance Regime

➢ Dry Douglas-fir Associations:
  • Lodgepole Pine
  • Grant Fir
  • Western White Pine
  • Garry Oak

➢ Assisted Migration:
  • Within Population Range
  • Range Expansion

Williams and Dumroese 2014
Climate Projections and Analogs

Seedlot Selection Tool

Climate analogs for Puget Sound Lowland selected by
• annual heat moisture index and
• mean coldest month temperature

Climate Scenario:
Seedlot climate: 1961-1990
Planting site climate: 2041-2070
RCP 8.5

Generated by the Seedlot Selection Tool
Resilience Planting Trial
Cedar River Watershed
Adaptive Management Framework - Operational Outplanting and Planting Trial

Planting Trial Design
6 Species/Seed source
3 Replication
3 Blocks/Sites
Browse Protection
Measuring survival, browse, phenology, and height growth
Tree Species

Western White Pine

Lodgepole (Shore) Pine

Garry Oak

Western Redcedar

Douglas-fir
  Washington (Kitsap)
  Oregon (Zone 262)
Early Tree Growth

3-year Height Growth by Species

Height Growth [cm]

- Shore Pine
- White Pine
- Oregon DF
- Wash. DF
- Garry Oak
- Redcedar
Spring Phenology –
Tree species respond to **warm** and **cool** spring

**Douglas-fir WA**

- 4 day earlier budbreak

**Shore Pine**

- 12 day earlier budbreak
Conclusions:

• **Mixed-species** can maintain forest productivity under changing climate and disturbance regime;

• **Within-population assisted migration** can add genetic diversity and adaptive capacity;

• **Phenology** (bud break) is important when considering climate change adaptation.
Stossell Creek
Forest Restoration and Climate Adaptation Project

- Seattle City Lights
- Seattle Public Utilities
- Mountains to Sound Greenway
- Northwest Natural Resources Group

**Douglas-fir**
- Puget Sound (231)
- Oregon Coast Range (071)
- NorCal. Coast Range (092)

**Western Redcedar**
- Puget Sound
- Oregon Coast Range

**Incense Cedar**
- NorCal. Coast Range

**Garry Oak**

**Grant Fir**

**Western White Pine**
Recommendations

• Pay attention to *productivity of the whole forest*;

• **Build adaptive capacity** through species diversity;

• **Integrate trials** into silvicultural operations.

Thank you.
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