LEGACIES OF INEQUALITY:

HISTORIC SOCIOECONOMIC INVESTMENT AND CURRENT URBAN FOREST HEALTH IN PORTLAND, OR

JOHNSON CREEK SCIENCE SYMPOSIUM

10/19/21

Jola Ajibade[1]
Jason Maxfield[1,2]
Kevan Moffett[3]
Aaron Ramirez[2]
Todd Rosenstiel[1]
Vivek Shandas[1]
Ingrid Zoll[2]

[1]Portland State University
[2]Reed College
[3]WSU – Vancouver

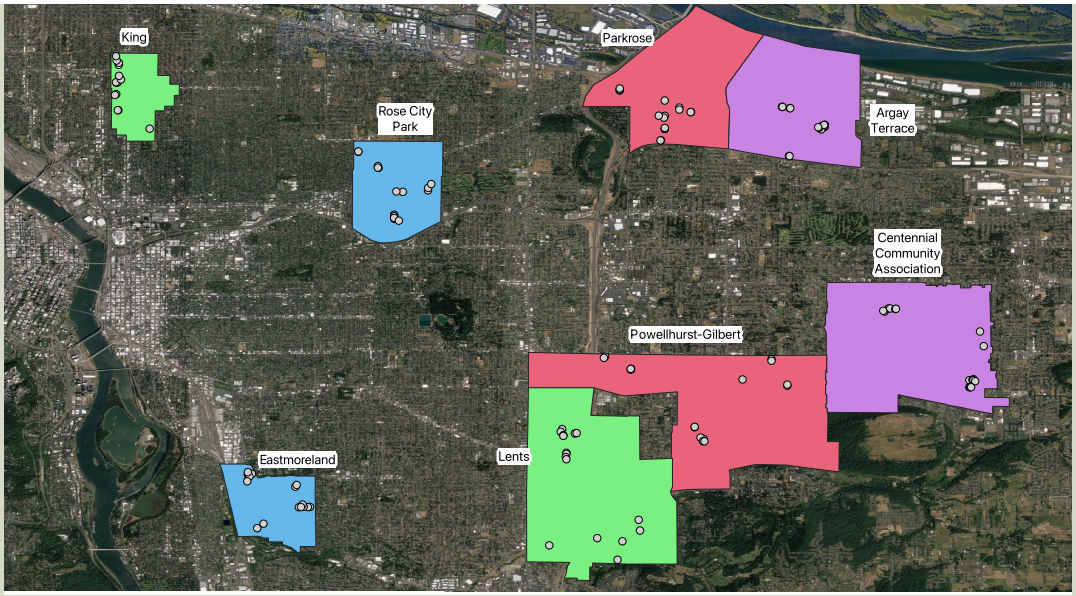
Presenting Author

PROJECT BACKGROUND:
SOCIOECONOMIC INEQUALITY AND URBAN FOREST HEALTH

- Interdisciplinary approach: plant physiology, social science, urban studies, hydrology, modeling
- "Coupled Natural and Human Systems" approach to understanding health relationships between humans and trees
- Building on previous studies showing unequal distribution of tree canopy across cities, as well as urban heat micro-climate mapping
- Central question: How do historical urban planning legacies (planting, maintenance, zoning, resource allocation, etc.) impact current urban forest health?
- Positive and negative impacts of trees depend on health status

SMART TREES
COLLABORATORY
Portland, OR

2021 FIELD SEASON, YEAR 1



8 Neighborhoods , 4 socioeconomic typologies:

Historically + currently advantaged

Historically advantaged, currently disadvantaged

Historically disadvantaged, currently advantaged

Historically + currently disadvantaged

Eastmoreland, Rose City Park

Argay, Centennial

King, Lents

Parkrose, Powellhurst-Gilbert

4 Large Tree Species

- Western redcedar
- Douglas fir
- Bigleaf maple
- Norway maple

4/species/neighborhood

Split between parks & street trees (based on neighborhood composition)

*Data collection began ~1week after “heat dome” event

MEASUREMENTS

- Height, DBH
- Crown width, Canopy base height
- Canopy condition, % missing/dead
- Ground cover, drip line + 25m, watering & buildings +/-
- Competition (NN, 4 quadrants, species, distance, and DBH)
- Temps (air + Flir in upper, mid canopy and bole)
- Porometer (stomatal conductance)
- Chlorophyll concentration
- Chlorophyll fluorescence
- Ceptometer (light capture/canopy density/leaf area)
- General health rating (good, fair, poor – to correspond to previous surveys)

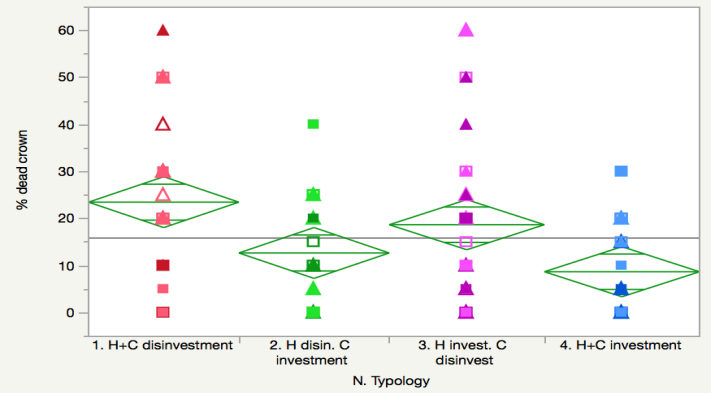
Urban Ecology!

Sampling Bigleaf maple next to freight train on Sandy Blvd.
(Tyler Camp, Sandhya Gunarathne, Ingrid Zoll)

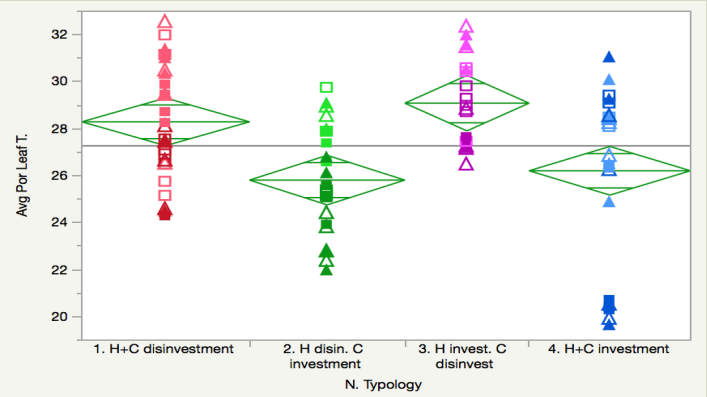
INITIAL FINDINGS

- **Canopy dieback variability** by neighborhood type
- Additional signals of **neighborhood temperature variability** (2-3°C)
- **Variable watering** by neighborhood type (13%, 41%, 41%, 59%), park/street (57% park, 24% street), and species (53% WRC, 30-38% other species)
- **Leaf/needle scorching** in all areas, more common in WRC, in parks, and for watered trees?!?
- BUT – no other major health differences by neighborhood
- Evidence of more resistant urban forest in disinvested areas, (acclimation or selective survival) or park/street sampling effect?

% canopy dead/missing by neighborhood type



Leaf temp. by neighborhood type



GOING FORWARD:
URBAN FOREST HEALTH AND SOCIOECONOMIC INEQUALITY

- Additional data analysis
- Integration with satellite data, other data sets
- More granular socioeconomic analysis based on proximity to tree?
- Begin planning next field season, considering how to improve/expand/ deepen
- Invite feedback & collaboration

Jason Maxfield: JasMax@pdx.edu