

# REDCEDAR HEALTH AND URBAN HEAT

## PRELIMINARY ANALYSIS



WASHINGTON STATE UNIVERSITY

### MORE THAN 80% OF PEOPLE LIVE IN CITIES AND RELY ON HEALTHY, FUNCTIONING URBAN FORESTS.

Urban trees provide critical services for keeping communities healthy, such as mitigating the impacts of heat waves, but these benefits are not equally distributed.

Planting trees is widely recognized as a method to mitigate these environmental health disparities. However, some tree species may 'feel the heat' more than others.

Western redcedar is an important component of urban forests in western North America, but increased levels of dieback have been observed and linked to consecutive longer and hotter droughts (Andrus et al 2024, J Biogeography).

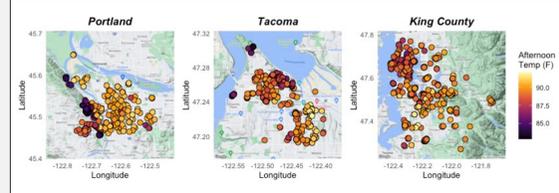


Urban redcedar dieback in Tacoma, Washington, USA.

### URBAN HEAT AND TREE HEALTH

Air temperatures were extracted for each tree from NOAA NIHHIS Urban Heat Island (UHI) Mapping Campaign data (<https://heat.gov>).

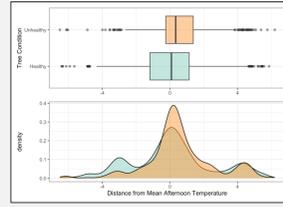
1,258 trees were shared in areas with UHI data: Portland, Tacoma, and King County.



Redcedar trees shared from urban areas with afternoon UHI data.

Analyses with urban heat data from all three cities were standardized because each UHI mapping campaign was completed on different days.

There was strong evidence for a relationship between standardized afternoon temperatures and whether a tree was categorized as healthy or unhealthy.



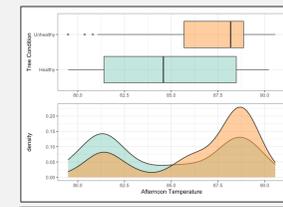
Individual analyses in each urban area were also completed to explore the relationships between afternoon heat and the probability of top-dieback.

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### PORTLAND

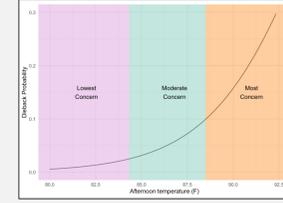
341 observations of redcedar trees were shared in Portland, Oregon by 45 participants.

There was strong evidence for a relationship between tree health and afternoon temperatures in Portland.



The probability of top-dieback increased with afternoon temperatures.

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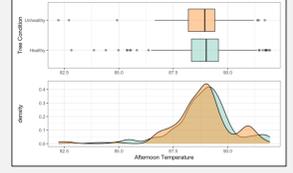
Redcedar with a dead-top.

Redcedar trees in areas of Portland with afternoon temperatures above 88.5 F had a probability of >0.1 for having a dead-top.

### TACOMA

343 observations of redcedar trees were shared in Tacoma Washington by 24 participants.

No relationship was found between tree health and temperature in Tacoma.

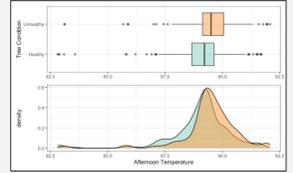


No relationship was found between tree health and temperature in Tacoma.

### KING COUNTY

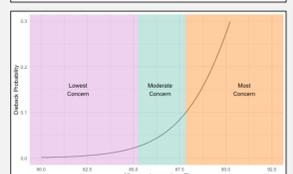
420 observations of redcedar trees were shared in King County, Washington by 66 participants.

There was strong evidence for a relationship between tree health and afternoon temperatures in King County.



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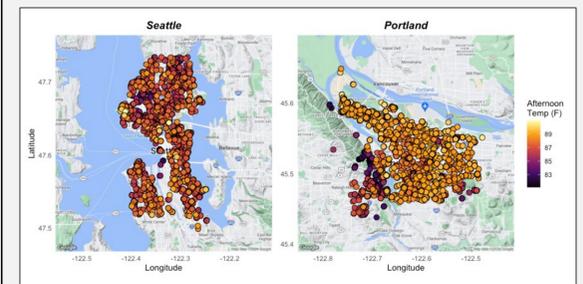
The probability of top-dieback increased with afternoon temperatures.



Redcedar trees in areas of King County with afternoon temperatures above 87.8 F had a probability of >0.1 for having a dead-top.

### INVENTORIED TREE HEALTH PREDICTIONS

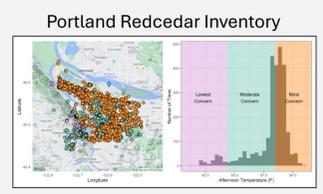
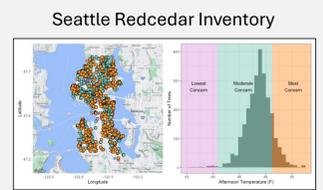
Air temperatures were extracted for redcedar trees in Seattle and Portland inventories.



Redcedar trees in Seattle and Portland.

Inventoried trees were then categorized based on their predicted probability of having a dead-top.

- Low concern (0 - 0.025)
- Moderate concern (0.025 - 0.1)
- Most concern (0.1 or higher)



### URBAN HEAT DISPARITIES

Western redcedar trees are vulnerable to afternoon heat. The probability of losing the benefits of redcedar is higher for communities in urban heat islands.

Given the relationship between redcedar health and urban heat, unhealthy redcedar trees may indicate where communities are most vulnerable to heat waves.

### HYPOTHESIS

Given the vulnerability of redcedar trees to longer and hotter droughts, redcedar will be less healthy in hotter areas of northwestern North American cities.

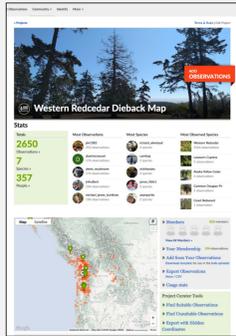


Tacoma urban heat island map and urban redcedar dieback.

### COMMUNITY ENGAGEMENT

Community scientists in the Forest Health Watch program participated to test this hypothesis through two approaches:

#### iNaturalist



iNaturalist project page.

#### Mass Participation

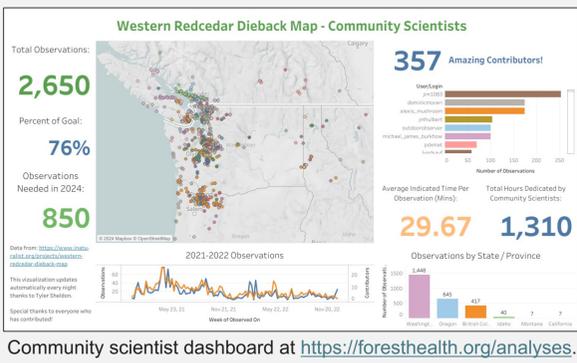
Anyone, anywhere could participate on iNaturalist.

#### Trained Participation

Trained cohort of community scientists visited randomly selected street trees in Portland.

357 community scientists shared 2,650 observations in the Western Redcedar Dieback Map (WRDM) project.

More information is available at <https://foresthealth.org/map>.



For more information visit <https://treehealth.wsu.edu/> or contact Joseph Hulbert at [hulbe@wsu.edu](mailto:hulbe@wsu.edu)

