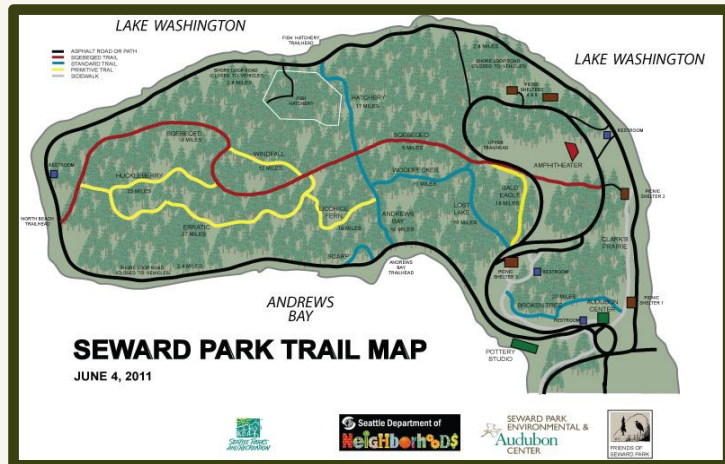


SEWARD PARK VEGETATION INVENTORY

Nate Butcher and Dr. Tim Billo

For Presentation on 1/18/25

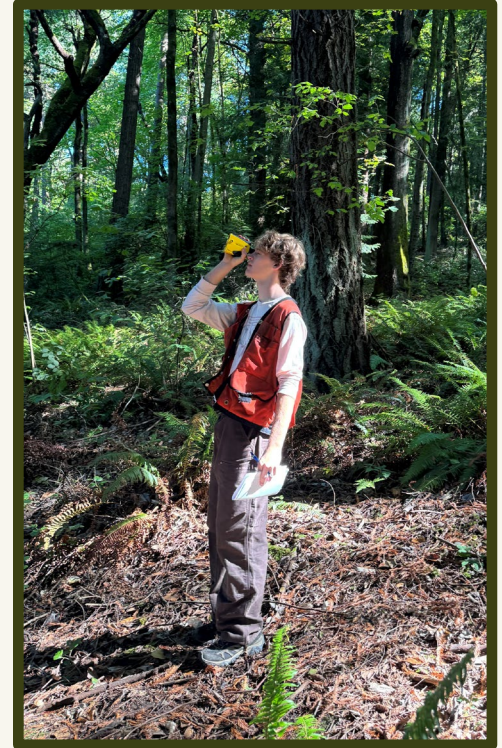
About Seward Park



- Ecological gem within urban Seattle.
- 120 acres of Douglas fir dominated old growth forest within the 300-acre park.
- Asset due to community and environmental value.
- Forest is stressed with the effects of climate change, disease, invasive plants, and human misuse.
- **No reliable encompassing baseline vegetation data has ever been collected.**

Survey Goals

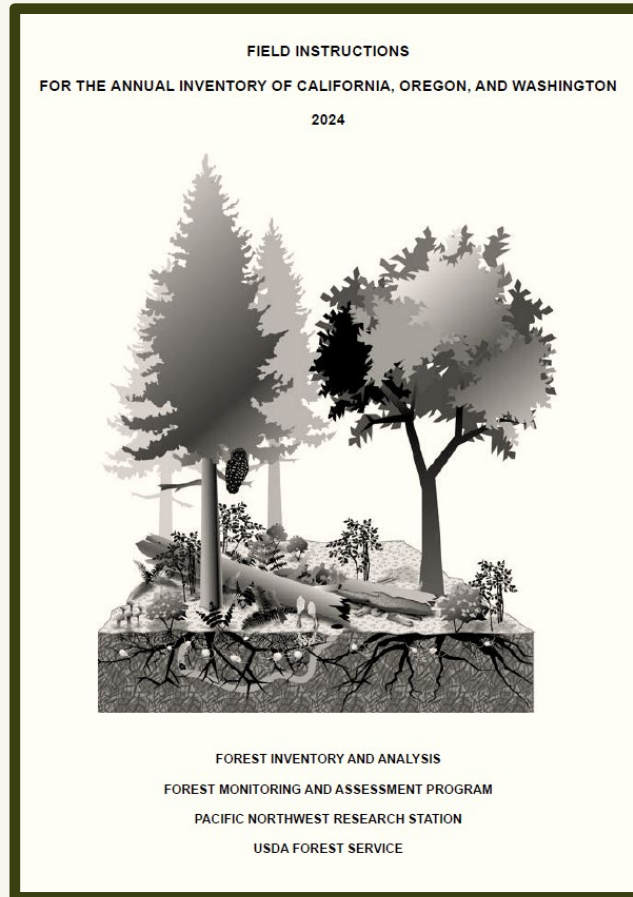
- To collect first comprehensive baseline vegetation data for future monitoring of Seward Park forest.
- To capture forest health in summer 2024.
- To replicate the study at regular intervals to identify changes within the flora of the park.



Tim and Nate hard at work!

- Partnered with Friends of Seward Park as well as an experienced Seward Park Forest Steward, Paul Shannon.
- Organized and conducted by Nate Butcher and Dr. Tim Billo UW.

About the Protocol



- Study protocol based off US Forest Service's *Forest Inventory and Analysis* protocol for the PNW.
- Prioritized reproducibility through precise documentation of tree locations, plot details, and walking directions for repeated data collection.
- Data was tree-biased with most data tree focused
- Understory vegetation and downed wood were also characterized.

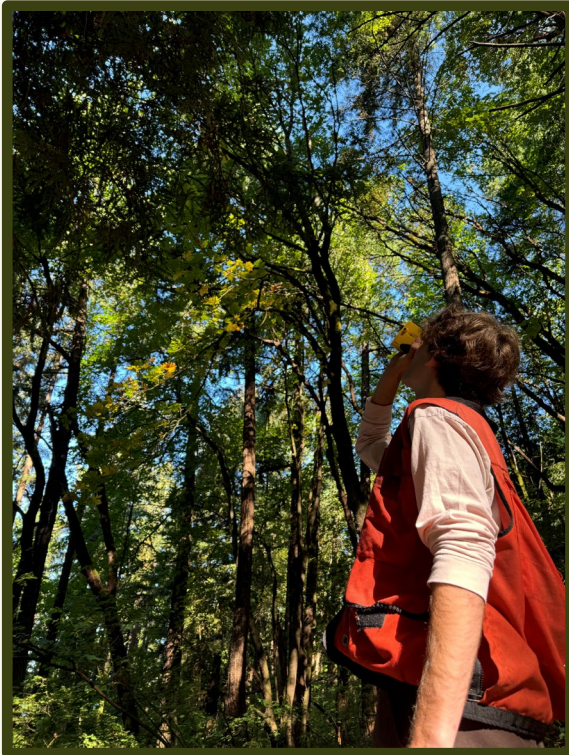
About the Plots

- 18 plots evenly distributed throughout the forest.
 - 58.9ft radius from plot center for tree data.
 - 24ft radius from plot center for understory vegetation data.
- In cases where plots were not surveyable due to intersection by trail, they were minimally **moved** west or east to avoid said factor. (See Map)
- Each plot center was marked by a piece of rebar.

Red pins indicate plot location.
Blue pins marks original plot if the plot needed to be moved.



The Data



Tree Data (Stems $>4.5'$ tall AND $>5''$ DBH within $58.9'$ radius):

Species, Density, Height (ft), Status, DBH (in), Crown (%), Crown Class, as well as Azimuth and Distance from plot center for resurvey purposes.

Understory Vegetation Data (within $24'$ radius):

Species, Percent ground coverage, Average height (ft).

Woody Stem/Sapling Data (All woody stems >2 ft tall AND $<5''$ DBH within $24'$ radius):

Stem count, Species/Sapling Count, Species height (ft), Status.

Downed Wood (E/W transect through plot center):

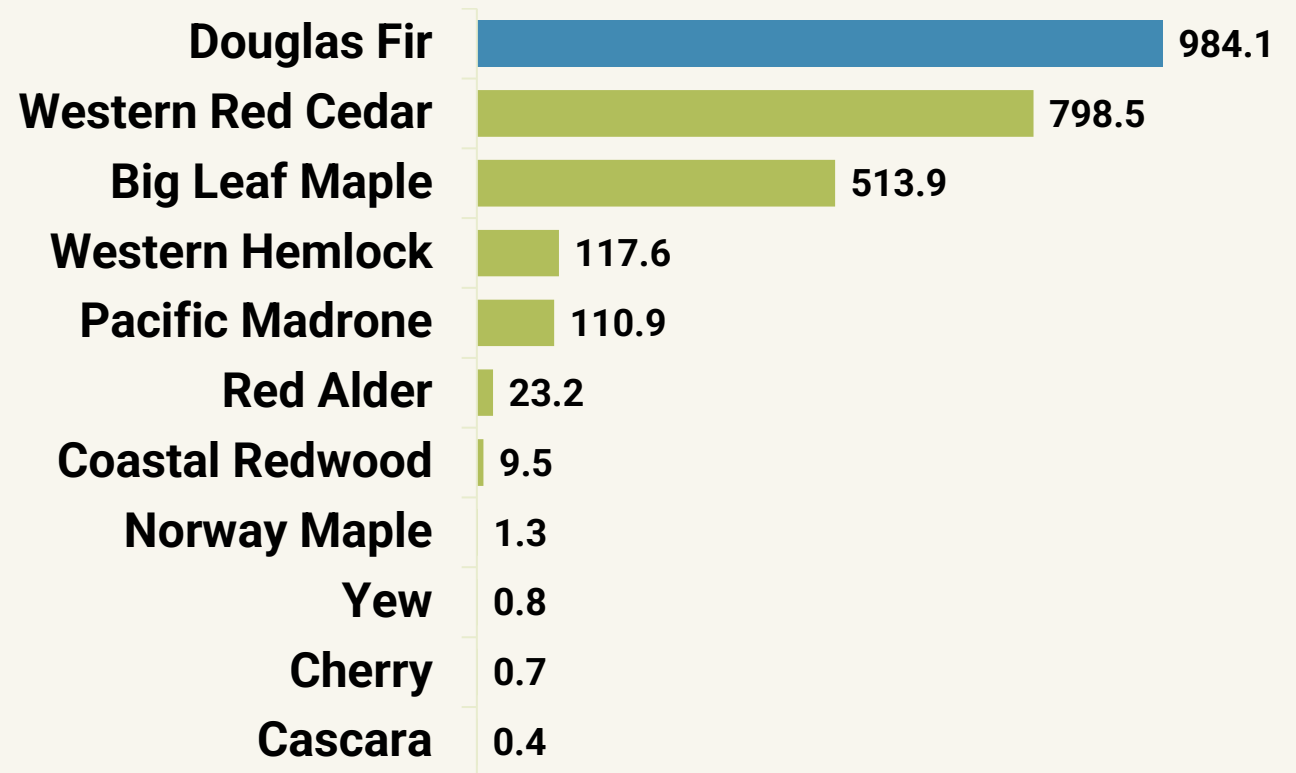
Diameter at intersection with transect (in), Largest Diameter (in), Smallest Diameter (in), Decay class, Species.

Forest Composition: Basal Area by Species

Douglas-fir emerged as the **most dominant species** in the old-growth core, both in count and size.

This aligns with Seward Park's historical context as a Douglas-fir-dominated forest.

Basal Area by Species per Acre, in Square Feet



Forest Composition:

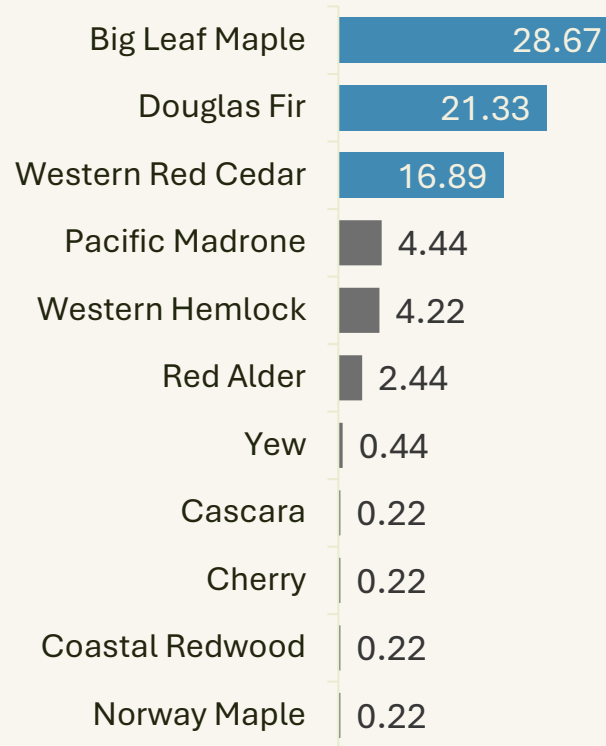
Density by species (all trees >5" DBH)

Big Leaf Maple is the **most common species** by far, followed by **Douglas Fir** and **Western Red Cedar**.

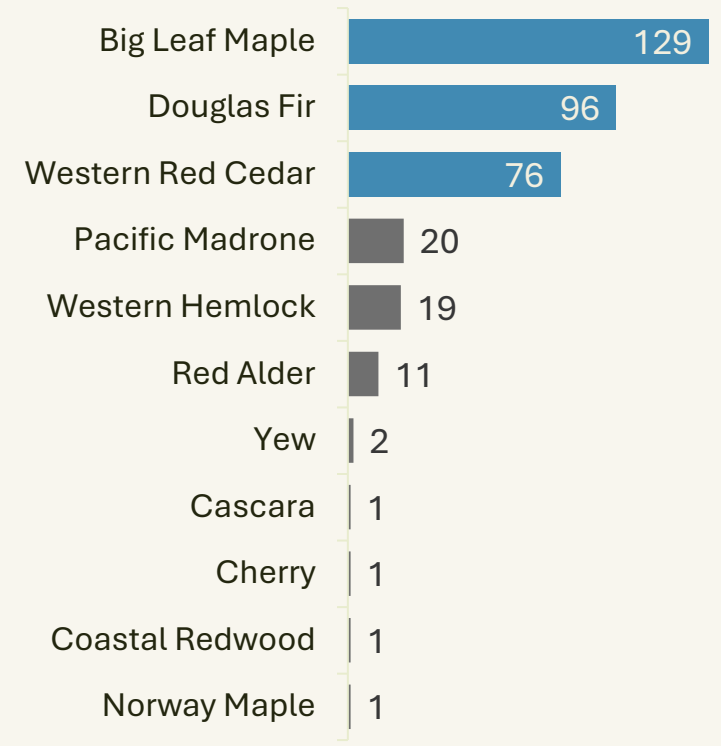
Other Species Encountered (not in plots)

Garry Oak
Cottonwood
Chinese or European chestnut
Oregon ash
Tulip
Grand fir

Trees per Acre by Species



Tree Count in 18 Plots



Forest Composition:

Average Tree Size by Species

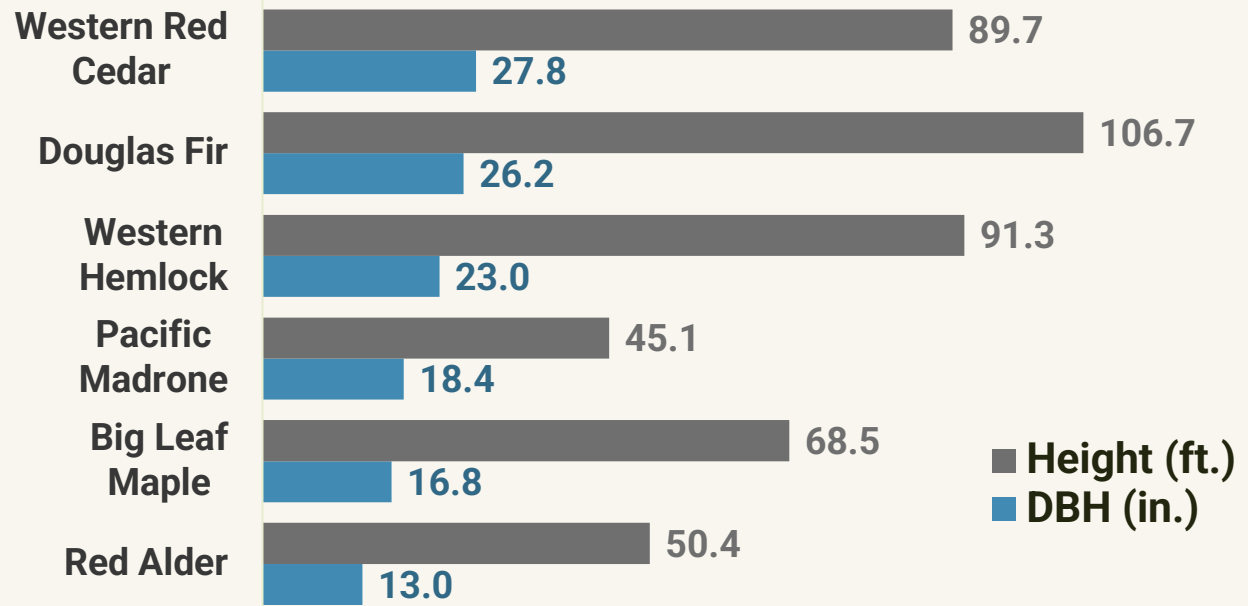
Plot records by the numbers:

- The tallest tree: **210-foot Douglas Fir** (plot 2, SW portion of the peninsula.)
- The largest DBH: **71-inch Big Leaf Maple**, (six trees sharing a stem.)

Outside of the plots:

- Largest DBH non-native: **76.3-inch Coastal Redwood**
- Largest DBH native: **69.5-inch Redcedar.**

Average Tree Height and Diameter at Breast Height (DBH) by Species

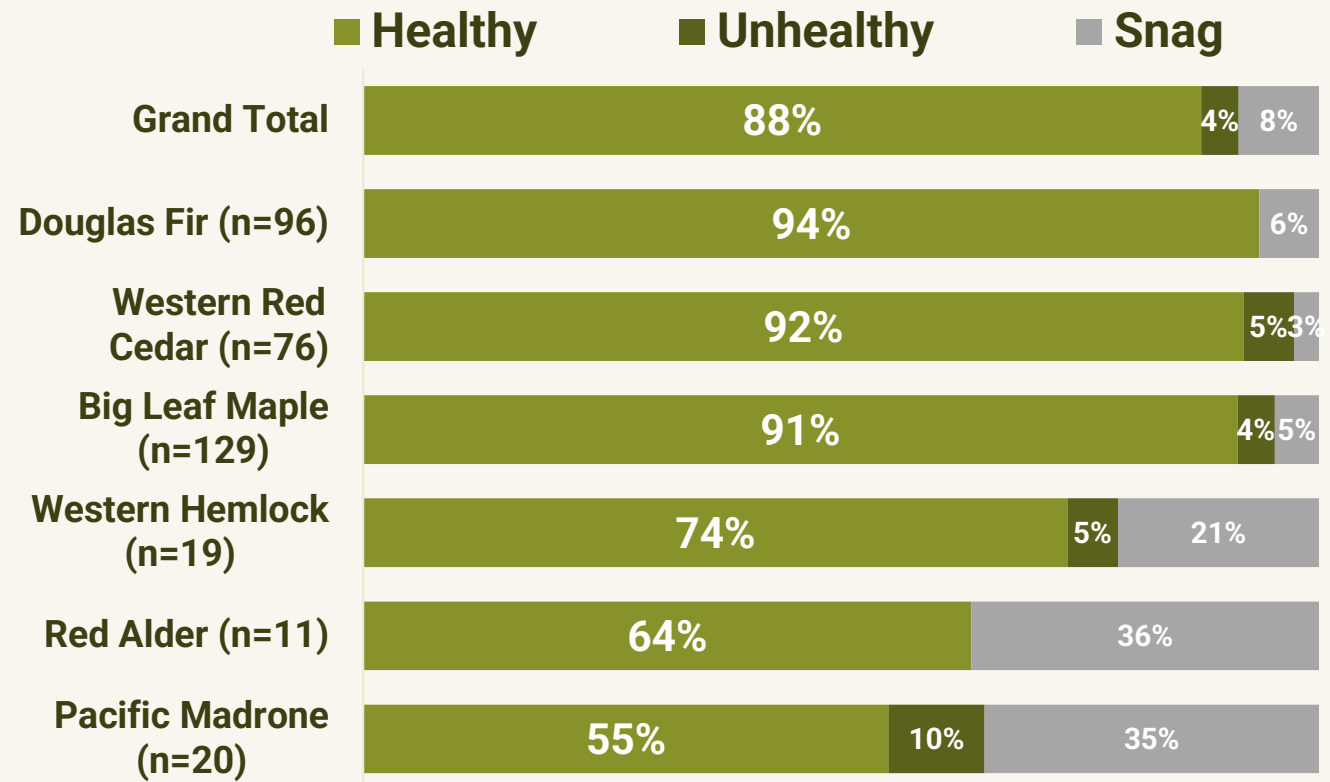


Tree Health Status by Species

Overall, the trees in Seward Park are relatively healthy.

Western hemlock, red alder, Pacific madrone are struggling.

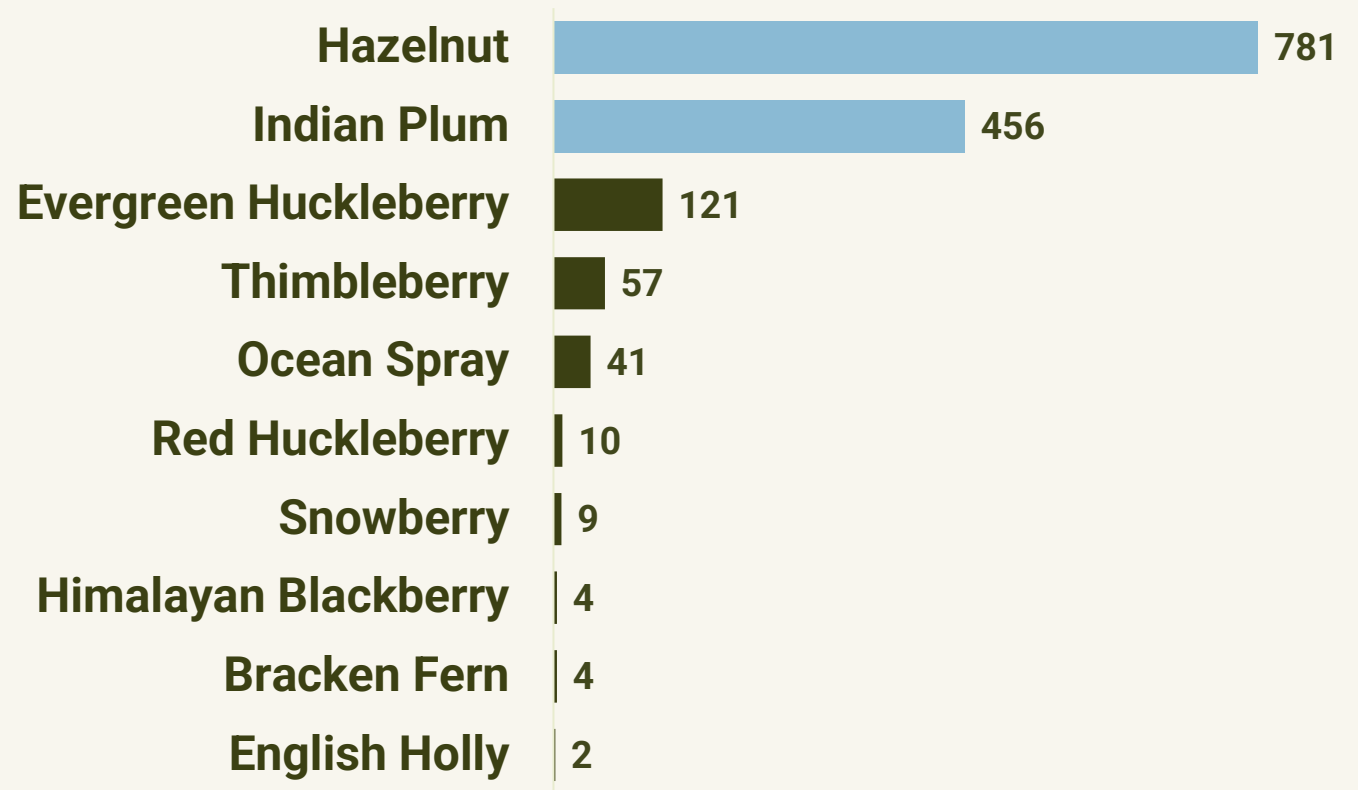
Note: Species with <3 in the study sample are excluded from this analysis.



Total Shrub Stem Count Across All Plots

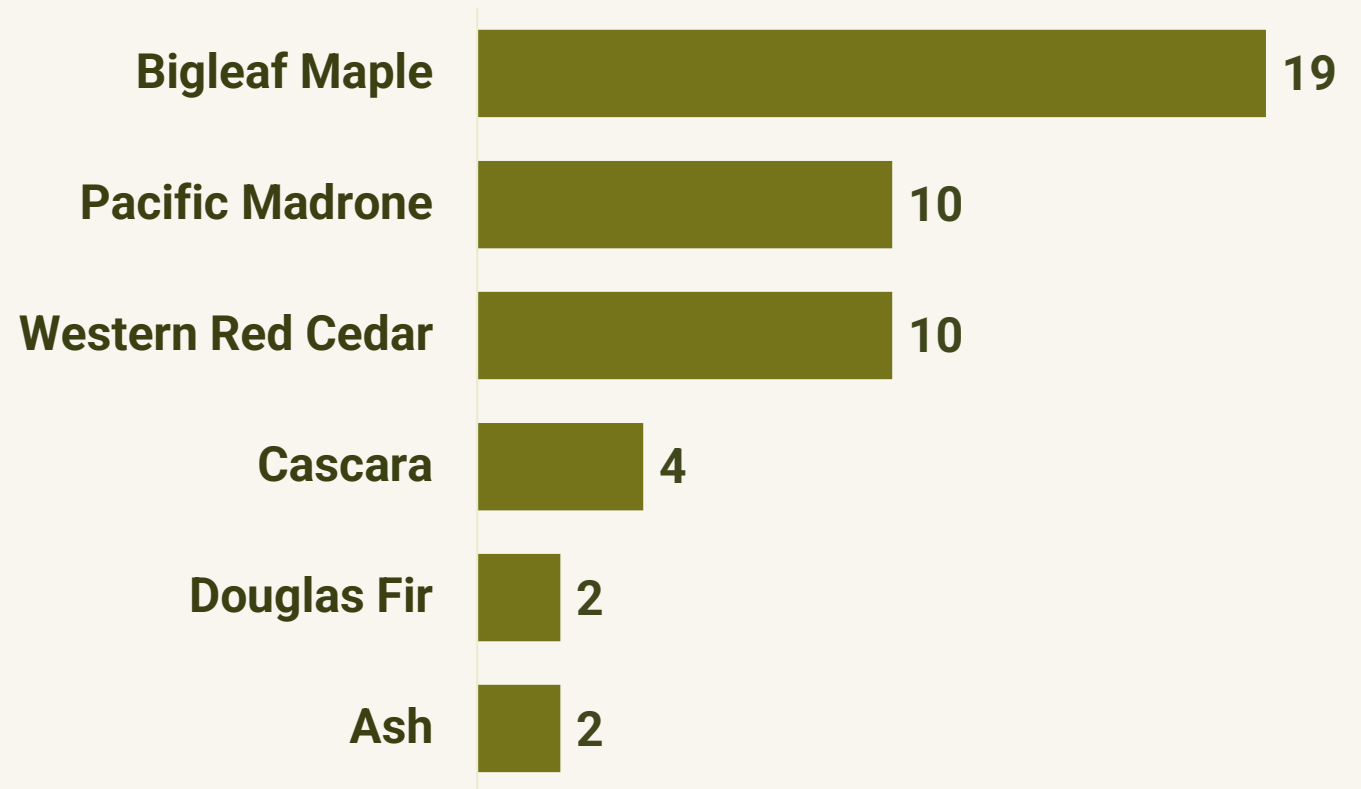
**All woody stems > 4.5' tall
AND <5" DBH within 24'
radius**

Note: Stems found in only 1/18 plots are omitted from this chart:
Himalayan blackberry, elderberry,
blackcap raspberry, salal, hairy
honeysuckle, dwarf rose, Pacific
crabapple.



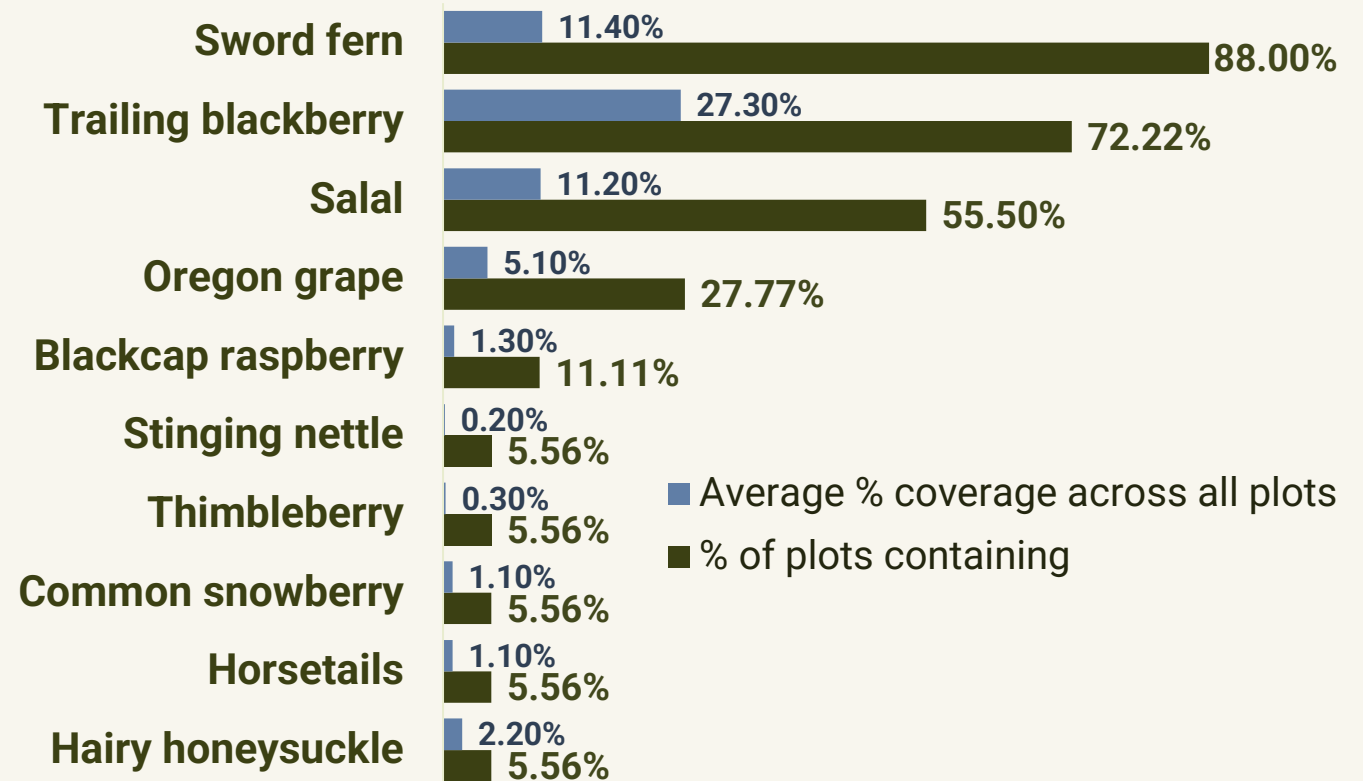
Sapling Count Across All Plots

Trees <5" DBH found in a 24-foot radius around the center of each quarter acre plot. Includes saplings down to 2" tall.



Percent Cover of Vegetation Under 4.5' Tall

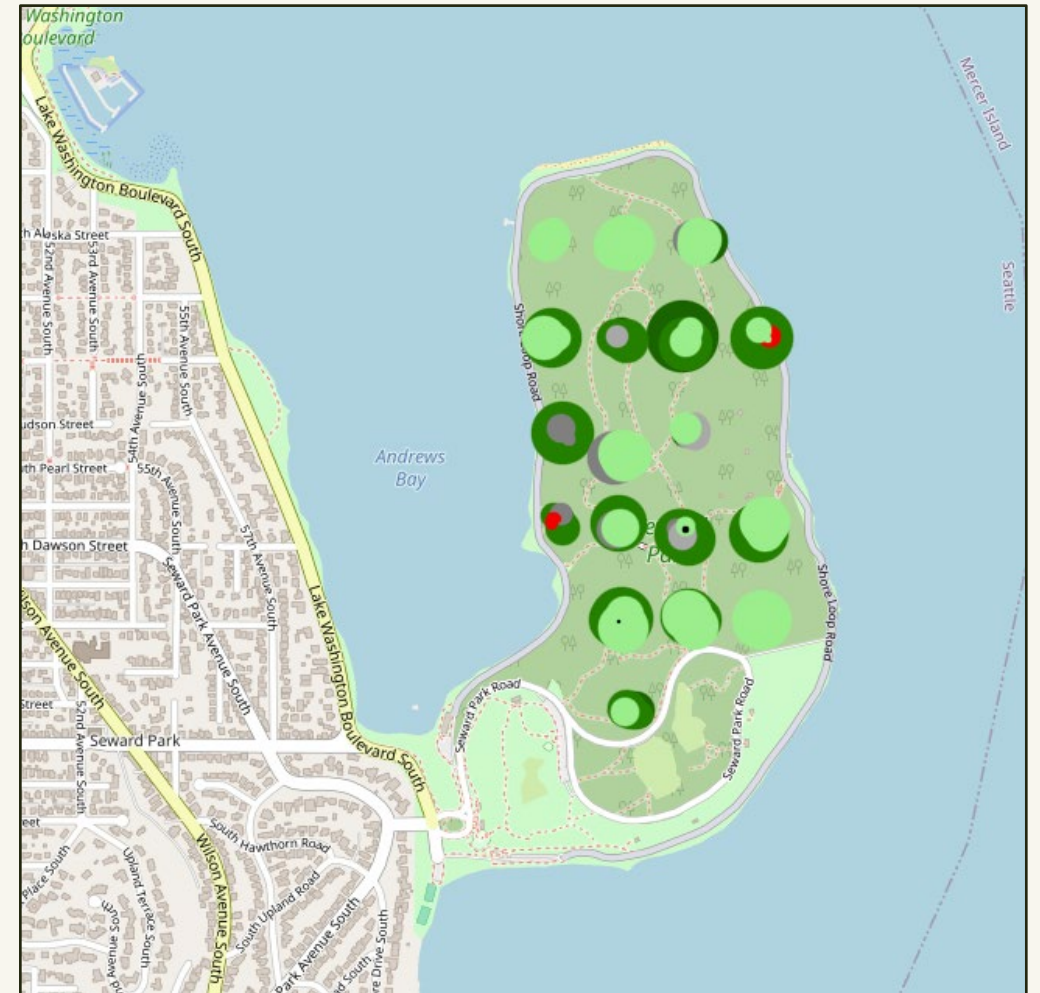
Sword fern, Trailing blackberry, Salal, and Oregon grape were the only shrubs that appeared consistently among the plots.



Distribution of Species

Park Steward Paul Shannon created this interactive map that visualizes each surveyed tree species, size and location.

<https://paulshannon.shinyapps.io/sewardFIA/>



Conclusions of Survey

- Douglas-fir dominates in terms of wood volume
- Big-leaf maple dominates in terms of density
- Western redcedar has stoutest trees on average
- Hazelnut and Indian plum (osoberry) highest density shrubs
- Hemlock/alder/madrone are struggling, other species healthy
- Small amounts of invasive species in most plots, but not dominant anywhere
- Surprising encounters with non-native trees (coast redwood and Norway maple are reproducing in park, mostly around edges of forest)

Future Work Brainstorm

(0-500 year plan)

To-Do List:

- ✓ Add plots at even intervals in old-growth forest
- ✓ Herbaceous layer and seedling survey
- ✓ Re-survey (when?)
- ✓ Incorporate into future monitoring program
- ✓ Refine Protocol

Questions we can address with the data:

- Relationship between canopy openness/other variables and sapling frequency (various species)
- Relationship between canopy openness and stem density (various species)
- Species overlap or competitive exclusion
- Relationship between mountain beaver burrow presence and understory vegetation
- Relationship between abiotic variables and forest health
- Monitoring forest health through time (e.g., sword fern, hemlock etc.)
- Seedlings and species regeneration
- Fire ecology and forest development/succession
- Climate change and forest succession