Identification, Effects and Management of 5 types of decay organisms found in Seattle Parks

Chris Rippey, Arborist
• Third generation Arborist

• Grew up in the bay area of California.

• Was 16 when I started working with my dad in tree care

• I fell in love with tree work, not trees

• Managed the preventative tree maintenance programs at Stanford University for 14 years.

• Moved to Washington and began working for Seattle Parks 2 ½ years ago
Seattle Parks System

- 6,412 Total Acres
  - 4,016 Acres of Developed Park
  - 2,396 Acres of Natural Area

- 480 Parks
  - >300,000 trees
  - >16,000 trees in our tree inventory
What are we focusing on?
- 171,615 trees in our **Buffer Zone**.
- Buffer Zone is a 50’ buffer around high use areas like beaches, paved roads and trails, playgrounds...etc)
- Buffer Zones are on average 56% of a given park
# Tree Risk Inspections Terms & Matrix

<table>
<thead>
<tr>
<th>TERM</th>
<th>DEFINITION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Likelihood of failure and impacts</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Imminent</strong></td>
<td>Failure has started or is most likely to occur in the near future even if there is no weather forces/rare occurrence. Will fail in a storm.</td>
</tr>
<tr>
<td><strong>Probable</strong></td>
<td>Failure may be expected under normal weather within a time frame. Likely to fail in a severe storm.</td>
</tr>
<tr>
<td><strong>Possible</strong></td>
<td>Failure could occur, but is unlikely during normal weather. May fail in a severe storm.</td>
</tr>
<tr>
<td><strong>Improbable</strong></td>
<td>Tree or branch failure not likely under normal conditions and may not fail in severe weather within a time frame.</td>
</tr>
<tr>
<td><strong>Risk rating</strong></td>
<td></td>
</tr>
<tr>
<td><strong>High</strong></td>
<td>Failed tree or part will likely impact a target. Fixed target fully exposed or high use road, adjacent street tree.</td>
</tr>
<tr>
<td><strong>Medium</strong></td>
<td>Failed tree or part may or may not impact target with equal likelihood. Frequently used area, fully exposed target on one side of a tree – partially protected house.</td>
</tr>
<tr>
<td><strong>Low</strong></td>
<td>Is not likely to fail or have an impact. Occasionally used area fully exposed to tree, constant target, well protected.</td>
</tr>
<tr>
<td><strong>Very Low</strong></td>
<td>Remote chance of impact. Rarely used site fully exposed, occasionally used but protected.</td>
</tr>
<tr>
<td><strong>Consequence of failure</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Severe</strong></td>
<td>Serious personal injury or death, damage to high value property or disruption of important activities.</td>
</tr>
<tr>
<td><strong>Significant</strong></td>
<td>Property damage of moderate to high value, damage of considerable distribution or personal injury.</td>
</tr>
<tr>
<td><strong>Minor</strong></td>
<td>Low to moderate property damage or small disruptions to traffic or a communication utility.</td>
</tr>
<tr>
<td><strong>Negligible</strong></td>
<td>Low value property damage or disruption that can be replaced and does not involve personal injury.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Occupancy rates of target (building, space, structure, person, etc.)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Constant</strong></td>
<td>Target present at all times or nearly all times</td>
</tr>
<tr>
<td><strong>Frequent</strong></td>
<td>Target is present for large portion of the day.</td>
</tr>
<tr>
<td><strong>Occasional</strong></td>
<td>Target is present infrequently or irregularly.</td>
</tr>
<tr>
<td><strong>Rare</strong></td>
<td>Target is very uncommon in target zone.</td>
</tr>
</tbody>
</table>

| Normal Weather          | 30-year cycle of weather minus the few abnormal weather events.                                                                                                                                                                                                                                                                   |

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### Matrix 2: Risk rating matrix.

<table>
<thead>
<tr>
<th>Likelihood of Failure &amp; Impact</th>
<th>Negligible</th>
<th>Minor</th>
<th>Significant</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very likely</td>
<td>Low</td>
<td>Moderate</td>
<td>High</td>
<td>Extreme</td>
</tr>
<tr>
<td>Likely</td>
<td>Low</td>
<td>Moderate</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Somewhat likely</td>
<td>Low</td>
<td>Low</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Unlikely</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>
Inspections
What we find
Porodadalea pini, red ring rot

- Canker rot which is found on old cuts and can be spread by insects or spores
- Very common on Doug fir trees
- 1-2 small conks could be monitored with inspection interval
- Large conk should have an advanced assessment
- Many small conks or several large conks could be cause for removal
Effects of Porodadalea pini on Doug fir
Phaelous schwinitzii, vevet-top fungus

- Root rot or heart rot
- Very common on Doug fir trees. I have seen it on grand firs, hemlocks and larch.
- Trees will appear bottled and tend to fail at stem around the top of the bottling
- If you choose to retain a tree with P. schwinitzii consider location, root inspection and reducing height of tree as tree will eventually not be wind firm
- Do not replant susceptible species
Effects of Phaelous schwinitzii
Effects of *Phaelous schwinitzii*
Phellinus weirii, Laminated root rot

- Root rot that will kill all types of roots thus most likely defoliating the tree before it fails from wind forces
- Effects native conifers especially Doug fir, Hemlock and we’re seeing it in drought stressed grand firs.
- Trees will defoliate from top down and die. Trees can also have stunted apical growth.
- Remove effected trees in urban areas
- Can last in area saprophytically for 100 years
- Do not replant susceptible species
Effects of Phellinus weirii
Laminated Root Rot at Lincoln Park

- Over 25 grand fir trees removed or reduced so they would not fail into the road. These trees were very large often over 100’ and old, probably planted in the 40’s
- Six month monitoring program where any tree with a dying top will be removed
Ganoderma applanatum, artist's conk

- Will grow on dead or live wood
- Causes a heart rot
- Can scratch and easily drawn on white underside. This distinguishes it from Fomitopsis pinicola, red belt fungus
- Effects broad-leaves or conifers but most common on big leaf maple
- Trees can compensate for loss in heart wood stability by “Eiffel Towering”
- Sound with mallet, use resistance drill or tomography unit to determine decay extent. Prune or remove based on findings
- Do not replant susceptible species
Effects of Ganoderma appalantum
Ganoderma applanatum, artist's conk
Kretzchmaria duesta, brittle cinder

- Canker rot that causes a soft wood rot, pocketed heart rot.
- Can consistently defeat wall 4 in an effort to keep wound open to get itself oxygen to grow
- Is not detectable by sonic tomography
- Found on broad-leaves especially big leaf maple and often on trees also affected by G. applanatum
- If found assume some part of the tree is decayed. Sound area with mallet, use resistance drilling, consult someone with experience in this decay organism
Effects of Kretzchmaria duesta
Armillaria sp., Shoestring Fungus

- Root rot and heart rot that effects conifers and broad-leaves
- Associated with over watering and fertilization
- Conks have a ring and usually light colored with darkening towards the center.
- Can cause sap weeping on the lower trunk
- Will destabilize trees and make them susceptible to wind throw
- Do not replant with susceptible species
Armillaria sp., Shoestring Fungus
The Tripler

-K. duesta

-G. appalantum

-Armillaria sp.
Recent Lincoln Park Stem Failure

- Big Leaf Maple off low use trail
- Inventoried by Contractors in 2016 as “Low” risk
- 89” DBH and 80’ tall
- Large honey bee nest in upper crown
- Had previous failure but no signs of decay organisms during visual inspection
- I agreed that is was a low risk tree and did not prescribe pruning
Recent Lincoln Park Stem Failure

- Tree had evidence of Armillaria sp., Kretzchmaria duesta and possibly some other kind of decay organism.

- But it was still a “Low” risk tree and we do not have the resources nor would the public tolerate us removing or drastically pruning all the “Low” risk trees in the park system so failures like this will continue and sometimes people or property will be impacted.
Washington Tree Failure Report Program

<table>
<thead>
<tr>
<th>Date Of Failure</th>
<th>Tree Specie</th>
<th>Diameter of Tree</th>
<th>Height of Tree</th>
<th>Condition</th>
<th>Failed Part</th>
<th>Root Failure</th>
<th>Branch Failure</th>
<th>Stem Failure</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mar 31, 2017</td>
<td>Acer macrophyllum (Big Leaf Maple)</td>
<td>32</td>
<td>80</td>
<td>Dead</td>
<td>Stem</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct 14, 2016</td>
<td>Ulmus Americana (American Elm)</td>
<td>34.5</td>
<td>71</td>
<td>Fair</td>
<td>Stem</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apr 7, 2017</td>
<td>Pseudotsuga menziesii (Doug Fir)</td>
<td>23</td>
<td>70</td>
<td>Good</td>
<td>Stem</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>