

# **Tacoma Parks Western Red Cedar Study Field Manual**



FOREST HEALTH WATCH COMMUNITY SCIENCE

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**More information available at <https://treehealth.wsu.edu/parks>**

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# Introduction

The purpose of this document is to provide guidance for classifying the health of western redcedar trees when contributing to the Western Redcedar Parks project. Mapping and monitoring western redcedar trees in parks will help conserve them in Tacoma's urban forest for future generations.

## Using iNaturalist

- Create an account on [iNaturalist.org](https://www.inaturalist.org)
- Join the [Western Redcedar Parks Study](https://www.inaturalist.org/projects/western-redcedar-parks-study) project
- Take measurements, record data, capture 4 photos.
- Add an observation of redcedar via mobile app or internet browser
- Tag **Western Redcedar Parks Study** project in the observation
- Answer required project questions about the observation
- Share the observation!



<https://www.inaturalist.org/projects/western-redcedar-parks-study>

### Tip!

We suggest downloading the iNaturalist app, creating an account, and joining the project before going out into the field. The iNaturalist app will work without wifi, but only if you are already signed in and following the project.

# Western Redcedar Identification

Western redcedar (*Thuja plicata*) are low elevation conifers that grow from Alaska to California and can grow around 120-150 feet tall. The branches of this tree, especially the lower branches, are known to droop and upturn at the end, creating an arch that helps identify this tree.

Leaves: Western red cedar leaves are evergreen that are dark green and have flat, wide scale-like leaves pressed closely to the stems which gives them a braid-like appearance.

Cone: The cones are small, brown, and clustered with oval shaped scales that sit upright on the branches. Once the egg shaped cones bloom they begin to look like rose buds.

Bark: The red, gray stringy bark makes Western red cedar easily distinguishable from other tree species. In mature trees, this bark is soft and can be easily peeled away from the trunk.

		
Cones, photo credit: JM Hulbert	Leaves, photo credit: F Dewitz	Bark, photo credit: F Dewitz


## Look Alikes




**Incense Cedar (*Calocedrus Decurrens*)**: Cones are larger and split open and are not erect on the branch. The leaves are tighter on the branch and point at the end, unlike redcedars

rounded tips. Unlike Western redcedar's drooping branches, Incense Cedar's branches are vertically oriented.

**Lawson Cypress OR Port Orford Cedar (*Chamaecyparis lawsoniana*):** Cones are more round and shaped like soccer balls. Leaves are flat scales but with white X's on the underside

**Yellow Cedar (*Cupressus nootkatensis*):** Yellow Cedar is easily recognized by its drooping branches. Cones are small and round, similar to the Port Orford Cedar.

		
<p>Incense Cedar Cones, photo credit: Ken Denniston</p>	<p>Lawson Cypress Cones, photo credit: Ken Denniston</p>	<p>Yellow Cedar Cones, photo credit: Ken Denniston</p>

		
<p>Incense Cedar Leaves, photo credit: Ken Denniston</p>	<p>Lawson Cypress Leaves, photo credit: Ken Denniston</p>	<p>Yellow Cedar Leaves, photo credit: nativeplantspnw.com</p>

		
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Incense Cedar, photo credit: Ken Denniston	Lawson Cypress, photo credit: Ken Denniston	Yellow Cedar, photo credit: Ken Denniston
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## Tagging Trees

Each redcedar observed will be given a tree number and be tagged with a 2” metal tag.

- Secure the tag by hammering an 2” aluminum nail, 1-inch.
- Tag the tree at 4.5 ft from the ground as a placeholder for where to measure the DBH in following years.
- Every 5 years the nail will have to be backed out of the tree to avoid the tree growing around the tag.
- Take a picture of the tag on the stem.


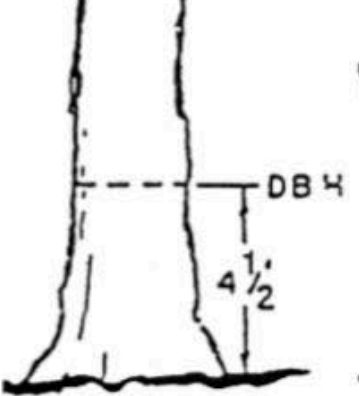
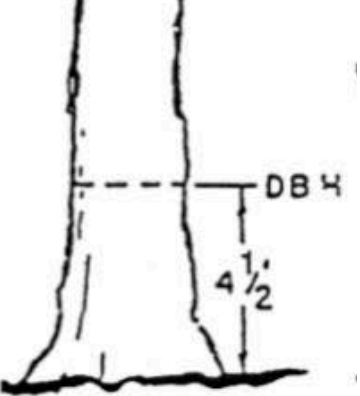
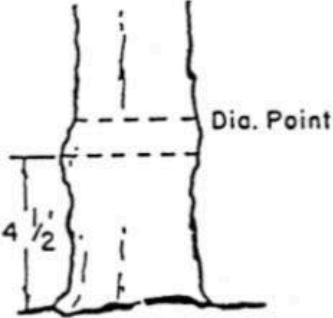
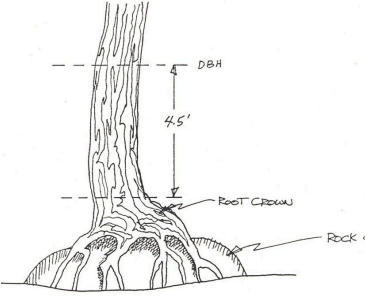
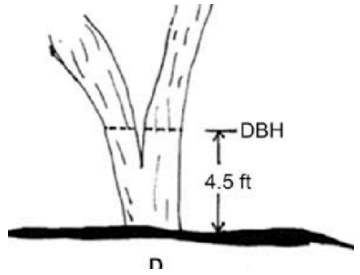
### Tip!

Review the diameter portion of the guide before tagging trees. In odd cases, trees may have to be tagged differently.



# Measuring Diameter

Measure the tree's diameter (circumference/ $\pi$ ) at the tree's tag, 4.5 feet from the ground. A tree diameter tape can be used to measure the diameter. Measurements will be taken in decimal inches. **If the tree's diameter is less than 4 inches, do not tag the tree. We will wait until the tree matures.**

<p><b>Tree on a Slope</b></p>  <p>Measure from uphill side if the tree is on a slope</p>	<p><b>Tree on a Level Ground</b></p>  <p>Measure any side on level ground</p>	<p><b>Tree Leaning</b></p>  <p>Measure the longer side if the tree is leaning</p>
<p><b>Tree Deformed at 4.5 ft</b></p>  <p>Measure from above the obstruction.</p>	<p><b>Tree with Roots Above Ground</b></p>  <p>Measure from above the root crown.</p>	<p><b>Tree with Multiple Stems</b></p>  <p>Measure each stem. Log the other diameter of the second stem in the notes section.</p>

**When trees have multiple stems:** measure each stem separately, use the largest stem for the tree tag and the default diameter value. Then, add the diameters of the other stems in the notes section.

# Overall Health Condition

Each tree will be rated for general health conditions (good, fair, poor, or dead). Do your best to estimate the tree health condition.

## Canopy Symptoms

The below information is presented to help you identify symptoms and other factors more confidently.

### Healthy

The tree is not experiencing any canopy symptoms.



### Tree is Dead

The tree is fully dead. This may look like just the trunk of a tree or could have branches or dead foliage that hasn't fallen if recently dead. A tree is considered alive if there is any living portion still on the tree.



## Top Dieback

A redcedar with deadtop is a tree that's canopy is dead at the top. Trees with old dead tops may not have any needles, where newer dead tops may still have brown or dried needles attached to the branches.

The tree will either stay this way, while the rest of the tree may continue to survive and grow, or the rest of the tree will dieback as well. Not all trees with old deadtop will die completely.

		
Old dead top, photo credit: iNaturalist user jdx070	New dead top, photo credit: iNaturalist user vlohr	New deadtop, some needles remain on branches, photo credit: JM Hulbert

## Branch Dieback/Flagging

Branch dieback is selected when individual branches are observed dying rather than entire parts of the canopy (in contrast to top dieback where the whole top dies). The branches typically turn brown and then drop the needles. Flagging is the forestry term for branches that turn brown inside of otherwise healthy canopies.



Branch flagging in western redcedar Photo credit: JM Hulbert

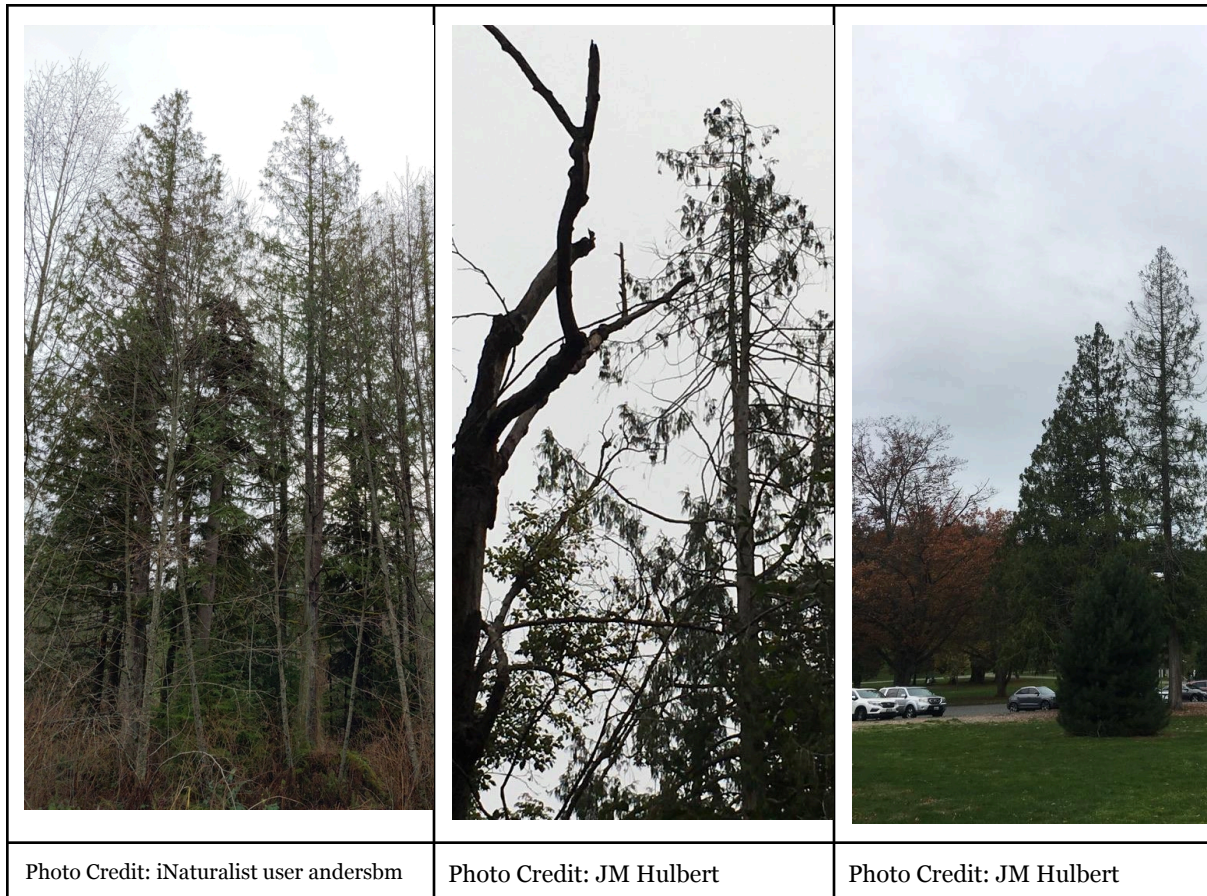


Branch dieback, dieback limited to lower section of one side of the tree. Photo credit: JM Hulbert

## Thinning Canopy

Some unhealthy redcedar have thinner canopies than the typical full canopy of healthy trees. Thinning trees appear more transparent or see-through. Canopies thin when more needles are dropped than normal. If you can easily see the sky while looking through the tree canopy, it may be thinning.

Thinning canopies can lead to other symptoms like branch and top dieback. However, some trees with thin canopies may recover if conditions improve or become more suitable for supporting robust loads of needles.








## Percent Dieback

Estimate the percent of the canopy that is unhealthy or dying. To estimate dieback, visualize the crown of the tree if full and in a percentage, determine what portion of the tree is unhealthy. If in a group, comparing dieback estimates can help get more accurate measurements if unsure.

# Understory Plants

Please list the most prevalent understory species (e.g. sword fern, salal). If none, please list 'no understory plants present'. Do not include weeds or very small forbs. We are interested in only recording the plants that are directly under the canopy, for some trees this may be nothing, or there may be many plant species.

Common species you may see

<p><b>Evergreen Huckleberry</b></p> 	<p><b>Sword Fern</b></p> 	<p><b>Bracken Fern</b></p> 
<p><b>Oregon Grape</b></p> 	<p><b>Salal</b></p> 	

# **Other Possible Factors Affecting Red Cedar Health**




There are many other factors that affect the health of western redcedar trees. For example, mechanical damage from equipment or fire may reduce the trees capacity to transport water from the roots to the needles. Therefore, it is important to note any other potential factors that could explain why the tree is unhealthy. Please take a minute to investigate any other possible factors that may explain why the tree is unhealthy. Below we present a few possible factors to watch out for.

# Root Disease

## Armillaria species

Armillaria species are fungi that can infect the roots of many tree species. They Western redcedar is moderately susceptible to *Armillaria ostoyae*, although infection is seemingly rare. Nonetheless, these root-disease causing fungi may become more important factors as trees become stressed from changing environmental conditions.

One can identify the presence of Armillaria species by searching for its white mycelial fan. The mycelia can feel spongy and sometimes the texture is compared to dried caulking found around the windows and bathtubs in your home. These mycelial fans can be found by peeling or scraping away the bark on lower trunks or exposed roots with a knife or hatchet.




		
Armillaria mycelial fan seen under bark on redcedar, photo credit: JM Hulbert	Armillaria mycelium on cut rotten root, photo credit: JM Hulbert	Armillaria mycelium on cut rotten root piece, photo credit: JM Hulbert

# Insect Damage

## Cedar Bark Beetle




Western redcedar is occasionally attacked by the cedar bark beetle. However, these infestations are typically understood as secondary effects on redcedar trees, following other primary factors that weaken the tree and increase susceptibility to colonization by the beetle.

Adult beetles bore into the soft tree cambium to lay eggs between the bark and the wood. Here the larvae hatch and feed on cambial tissues creating new tunnels and producing a gallery. Beneath the bark, these galleries are likely to be seen, along with larvae in the winter seasons.

		
<p>Cedar Bark beetle galleries, photo credit: JM Hulbert</p>	<p>Insect hole in the trunk of a tree. Photo credit: iNaturalist user alexis_mushroom.</p>	<p>Beetle gallery surrounded by frass, photo credit: JM Hulbert</p>




# Invasive Plants

Some common invasive plant species to the PNW are shared below. Noting their presence can help understand their impacts on the health of western redcedar trees.

<p>English Ivy (<i>Hedera helix</i>) - Common species of ivy brought over from Europe for gardens, now common throughout the PNW. It is fast spreading without containment and commonly found in forest undergrowth, climbing up trees.</p>	<p>Himalayan Blackberry (<i>Rubus armeniacus</i>) - Multiple species of blackberries were introduced to North America. A favorite of birds and rodents, the seeds are easily dispersed. They are difficult to gain control and remove because of deep root systems.</p>	<p>Scotch Broom (<i>Cytisus scoparius</i>) - Coming from the UK and Western Europe, Scotch broom is a prevalent invasive species within the PNW. Outcompeting most native species and having limited herbivory from native species, Scotch broom continues to thrive in most climates of the region.</p>
		
<p>English Ivy climbing tree. Photo credit: iNaturalist user SedgeQueen</p>	<p>Blackberry bush with developing fruit. Photo credit: iNaturalist user tomerler</p>	<p>Scotch broom found in Warrenton, OR. Photo credit: iNaturalist user jlmeek</p>

## Natural Seasonal Foliage Browning and Needle Drop

In late summer and into fall, needles will naturally turn yellow or brown and fall off. This natural drop of the older needles makes room for new needles. Note that trees with this symptom are considered healthy. Brown needles are generally only a concern if the entire branch (including newest, outer needles) is damaged or dying.

		
Normal, seasonal dieback seen in inner needles of branches, photo credit: iNaturalist user angelique_k	Normal, seasonal dieback seen in inner needles throughout entire tree, photo credit: JM Hulbert	Note the seasonal needle drop is inner most (oldest) needles on the branch, photo credit: JM Hulbert

## Winter 'Sunscreen'

Western redcedar trees can produce a 'sunscreen' to protect their needles from cold temperatures. Trees with this sunscreen are healthy. The sunscreen can be distinguished from brown crispy dead needles by viewing the underside of the needles. Healthy branches with sunscreen will still be green and vibrant on the underside.



Redcedar with brownish tint from winter sunscreen. Tree will return to green color in summer.  
Photo Credit: F Dewitz

# Signs of Sapsucker feeding

Please indicate if you observe any signs of sapsucker feeding on the bole of the tree. Note that signs of feeding may be too high up the tree bole for a good picture.



Horizontal lines of small holes in the bark are typical signs of sapsucker feeding.

## Additional Resources

Forest Health Watch Home Page: <https://foresthealth.org/>

Western Redcedar Dieback Map iNaturalist Main Page:

<https://www.inaturalist.org/projects/western-redcedar-dieback-map>

Oregon Department of Forestry 'Why is my Tree Dying':

<https://www.oregon.gov/ODF/Documents/ForestBenefits/TreeDeclinesRedcedar.pdf>