### Commentary on Tree Diseases in the Greater Seattle Area Forest Parks

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*Dr. Robert Edmonds taught ISA tree disease courses to arborists for many years, using Seward Park's old-growth forest as his laboratory. There is no one better versed on this topic, and in this place. We are grateful to Bob for his guidance and support.*

The forested parks of the greater Seattle area are gems. However, they are forever changing and are not static. One of the major agents of change are tree diseases caused by fungi which kill trees. The most common tree species are Douglas-fir, western hemlock, westerrn redcedar. Pacific madrone, red alder, big leaf maple, and black cottonwood. Western white pine occurs only rarely.

Last summer and fall [2021], I walked in parks in Seattle (Seward, Lincoln, and North Acres), Shoreline (Hamlin and Shoreview), Lake Forest Park (Grace Cole Nature area), and St. Edward State Park (Redmond) to determine their forest health and disease status In the past I have visited other parks in Seattle (Ravenna and Schmitz), Mercer Island (Pioneer Park), Sammamish (Beaver Lake Park), Bellevue Botanical Garden, and the Innis Arden community. These areas are mostly second-growth forest, except for Seward Park which has old growth. Large old trees are also present in Lincoln and St. Edward Parks and Innis Arden.

**DISEASES**

A variety of diseases are present in these parks. They are native diseases. Below I describe those in Seward Park and then other parks.

**SEWARD PARK**

The diseases, which are all native and not introduced, at Seward Park include:

**Root and butt diseases**

* [Phellinus sulphurascens](https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5187461.pdf): Laminated root rot – Douglas-fir less than 80 years
* [Heterobasidion occidentale](https://apps.fs.usda.gov/r6_decaid/views/heterobasidion_root_disease.html): Heterobasidion root and butt rot and Annosus root disease – mostly western hemlock
* [Phaeolus schweintzii](https://en.wikipedia.org/wiki/Phaeolus_schweinitzii): velvet-top fungus – mostly older Douglas-fir
* [Armillaria ostoyea](https://en.wikipedia.org/wiki/Armillaria_ostoyae): Armillaria root disease – all tree species

**Stem diseases**

* [Ganoderma applanatum](https://en.wikipedia.org/wiki/Ganoderma_applanatum): Artist conk on big leaf maple
* [Porodaedalea pini](https://en.wikipedia.org/wiki/Phellinus_pini): older Douglas-fir
* [Postia sericeomollis](https://tidcf.nrcan.gc.ca/en/diseases/factsheet/1000018)[: western redcedar](https://en.wikipedia.org/wiki/Kretzschmaria_deusta)
* [Kretzschmaria deusta](https://en.wikipedia.org/wiki/Kretzschmaria_deusta): Bigleaf maple

**Stem and branch diseases**

* [Neofusicoccum arbuti](https://pnwhandbooks.org/plantdisease/host-disease/madrone-arbutus-menziesii-canker): Madrone canker

**Other diseases**

* [Sword fern decline](https://ppo.puyallup.wsu.edu/plant-health-concerns/swordfern/) in Washington and

[decline in Seward Park](https://theplanetmagazine.net/the-forest-in-the-city-c16fe8795833)

* [Hemlock decline](https://www.sewardpark.org/hemlock-mortality/#:~:text=We have seen an unusual,lead to top-down loss.)
* [Bigleaf maple decline](https://www.washington.edu/news/2021/09/30/bigleaf-maple-decline-tied-to-hotter-drier-summers-in-washington/)
* New disease: [Sooty bark disease](https://foresthealth.org/sooty-bark-disease-on-maples-in-seattle/) in bigleaf maple – not in Seward Park yet

Active root and butt rots are causing the most mortality in Seward Park. *Phellinus sulphuracens* is active in younger Douglas-fir trees. Older Douglas-fir trees (>80 years) have considerable *Phaeolus schweinitzii*. You don't normally see much *Phaeolus* in younger trees. Western hemlock has *Heterobasidion occidentale* especially in the north end of the Park. Western hemlock decline is also occurring, but the cause is yet to be determined. There appears to be a foliage disease on the declining hemlock, but it has not been identified. Climate change might explain this decline and the apparent foliage disease in hemlock. *Armillaria ostoyae* does occur but not at the scale of the other diseases. Old western redcedar along the main trail has some stem decay caused by *Postia*. Madrone canker is very common.

Sword fern decline and death are apparent in the understory, but no specific cause has been identified.

**OTHER PARKS**

Most of these same diseases occur to a lesser or great extent in the other parks I have visited depending on the populations and mixes of the tree species and the age of the forest. Forests in the other parks are second growth established after clearcutting of the old growth in the early 20th century, making them less than 120-years old. Again the root and butt rots are causing the most mortality. *Phellinus* is active in Pioneer and Beaver Lake, Shoreview and North Acres parks, while the older Douglas-fir trees in Innes Arden have *Phaeolus*. Big leaf maple in Pioneer and Ravenna parks have *Kretzschmaria deusta*.

I have not seen the amount of mortality occurring in western hemlock at Seward Park in any of the other parks. No sword fern dieback was observed.

Climate change is no doubt creating stress in all the tree species mentioned above, especially for species that naturally live in moist environments, such as western redcedar and western hemlock. They may die directly from summer drought or the increasing stress makes them more susceptible to diseases. Susceptibility to *Armillaria* increases with tree stress is and capable of causing root disease in all of the tree species. Bigleaf maple decline is thought to be dying as a result of the changing climate. Madrone is dieing from madrone canker in all the parks

**IMPACT OF DISEASES**

Natural forests are always changing with time as a result of disturbances and species characteristics leading to a mix of different species. The theoretical natural successional sequence in forests of lowland western Washington after large-scale disturbances like fire and windthrow would be hardwoods (e.g., red alder) followed by a mixed conifer forest of shade intolerant Douglas-fir and the shade tolerant species (western redcedar and western hemlock). Western hemlock prefers to regenerate on coarse woody debris (logs) and there may not be enough in forest parks. Climate change will have a big influence as summers become drier. Small scale disturbances, like tree diseases, cause canopy gaps, increase biodiversity, create habitats like snags and CWD (Coarse Woody Debris) on the forest floor and change the composition of tree species on the landscape. Generally, death of the conifers leads to more hardwoods and invasive species, like holly, become a problem.

Tree mortality caused by these diseases and more recently climate change has resulted in resetting forest succession in the parks so that many sites now have more more hardwoods than conifers. Douglas-fir forests could be set back to hardwoods like (red alder, vine maple, bigleaf maple and black cottonwood). The conifer state, however, is the most desirable. Once the Douglas-fir have died it is hard to regenerate them because they need large disturbances and lots of light. This why it does well in clearcuts. In some parks the rate of conifer mortality seems to be increasing, especially Seward Park.

So you may ask what is the future of these parks? Once trees have these diseases they are very difficult to control or cannot be controlled at all. Knowing about forest succession and how much disease is occurring on the different tree species one might be able to predict what the forests might look in the future and how to manage them. Not all the conifers will die since the diseases typically occur in patches, but the forests will inevitably change with time. It seems likely there will be more hardwoods and less conifers, but it will probably be different in each park.

Can these parks be managed to maintain the desired conifer cover? I should add here that most of these diseases cannot be cured once the trees are infected. Many of the old-growth Douglas-fir trees in Seward Park are infected with *Phaeolus schweinitzii* and could fail.

Thoughts on how to manage forest parks in Seattle have been considered by the [Green Seattle Partnership and Seattle Parks and Recreation (2018)](https://www.greenseattle.org/wp-content/uploads/2020/06/SPR-GSP_ForestStewardshipReport_v3.6.pdf). Continued thought about the management of diseases needs to be included.

[A detailed forest management plan for Stanley Park in Vancouver, BC was produced in 2021](https://vancouver.ca/files/cov/Stanley-Park-Forest-Management-Plan.pdf).