

DAVID DOUGLAS TRAIL

About the Arboretum

Pacific Forestry Centre (PFC) staff created the Centennial Arboretum and David Douglas Trail in 1999 to celebrate the Canadian Forest Service’s (CFS) centennial. The trail is named in honour of British botanist David Douglas who introduced about 240 species of plants and animals from the Pacific Northwest to Britain in the 1800s.

The arboretum – a living collection of woody plants – is essential to ongoing scientific studies by PFC scientists. Enjoy a self-guided tour following the 26 numbered posts marking the trail through the arboretum. It’s an easy one-hour walk, and you’ll see examples of many native and exotic trees on the grounds, many grown and studied as part of research being conducted by our scientists. The results of some of those successful studies are now part of commercial industry in British Columbia.

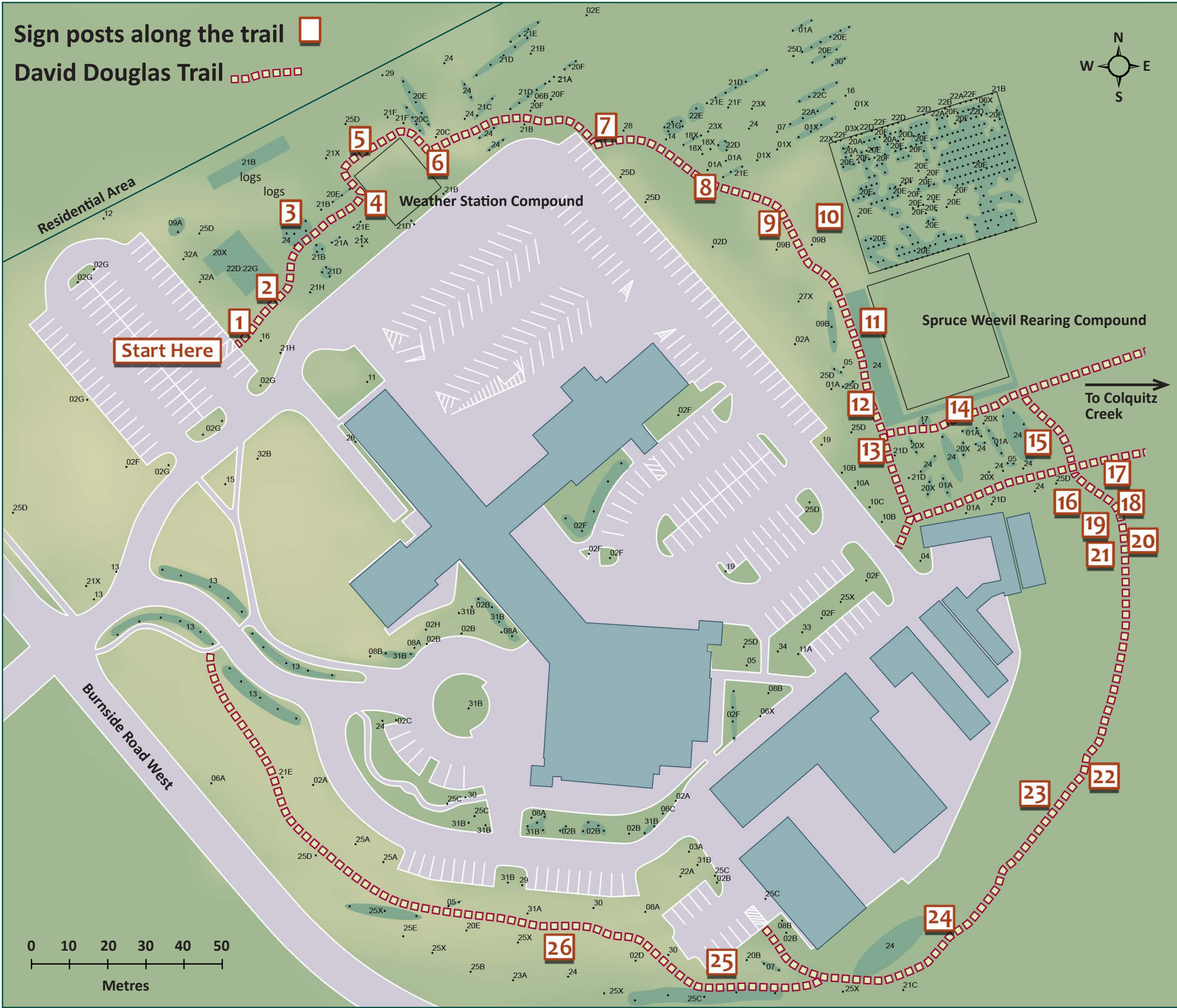
Pacific Forestry Centre

The PFC is one of five centres operated by the CFS, a part of Natural Resources Canada, a federal government department. The CFS provides science and policy expertise and advice on national forest sector issues, working closely with the provinces and territories. Building on more than a

century of experience, scientists, technicians, economists, and other dedicated professionals conduct research, carry out analyses, and provide policy and program leadership on a wide range of matters related to Canada’s forests and forest sector. Established in 1965, the PFC is the federal centre of Canada’s forest-based research efforts in British Columbia and Yukon. Researchers at the PFC specialize in forest entomology and pathology, fire management, forest inventory and monitoring, climate change, and economic and market research. The centre also houses the Canadian Wood Fibre Centre. The public, the Canadian forest sector, academic institutions, and industry rely on the centre’s science and expertise.

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PFC Arboretum Tree Species

- | | |
|--|---|
| 01A: Grand Fir (<i>Abies grandis</i>) | 20E: Sitka Spruce (<i>Picea sitchensis</i>) |
| 01X: Fir sp (<i>Abies</i> sp) | 20F: White Spruce (<i>Picea glauca</i>) |
| 02A: Bigleaf Maple (<i>Acer macrophyllum</i>) | 20X: Spruce sp (<i>Picea</i> sp) |
| 02B: Douglas Maple (<i>Acer palmatum</i>) | 21A: Jack Pine (<i>Pinus banksiana</i>) |
| 02C: Japanese Maple (<i>Acer palmatum</i>) | 21B: Lodgepole Pine (<i>Pinus contorta</i> var. <i>latifolia</i>) |
| 02D: Manitoba Maple (<i>Acer negundo</i>) | 21C: Monterey Pine (<i>Pinus radiata</i>) |
| 02E: Paperbark Maple (<i>Acer griseum</i>) | 21D: Ponderosa Pine (<i>Pinus ponderosae</i>) |
| 02F: Red Maple (<i>Acer rubrum</i>) | 21E: Scots Pine (<i>Pinus sylvestris</i>) |
| 02G: Red Maple var. Red Sunset (<i>Acer rubrum</i> var. Red Sunset) | 21F: Shore Pine (<i>Pinus contorta</i> var. <i>contorta</i>) |
| 02H: Vine Maple (<i>Acer circinatum</i>) | 21G: Sugar Pine (<i>Pinus lambertiana</i>) |
| 03A: Red Alder (<i>Alnus rubra</i>) | 21H: Western White Pine (<i>Pinus monticola</i>) |
| 04: Saskatoon Berry (<i>Amelanchier alnifolia</i>) | 21X: Pine sp (<i>Pinus</i> sp) |
| 05: Pacific Arbutus (<i>Arbutus menziesii</i>) | 22A: Black Cottonwood (<i>Populus trichocarpa</i>) |
| 06A: White Birch (<i>Betula papyrifera</i>) | 22B: Eastern Cottonwood (<i>Populus deltoides</i>) |
| 06B: European White Birch (<i>Betula pendula</i>) | 22C: European White Poplar (<i>Populus alba</i>) |
| 06C: Grey Birch (<i>Betula populifolia</i>) | 22D: Hybrid Black Poplar (<i>Populus x canadensis</i>) |
| 06X: Birch sp (<i>Betula</i> sp) | 22E: Trembling Aspen (<i>Populus tremuloids</i>) |
| 07: Yellow Cedar (<i>Chamaecyparis nootkatensis</i>) | 22F: White Poplar (<i>Populus alba</i>) |
| 08A: Pacific Dogwood (<i>Cornus nuttallii</i>) | 22G: Hybrid Black Cottonwood (<i>Populus x deltoides</i>) |
| 08B: Red Osier Dogwood (<i>Cornus sericea</i>) | 22X: Aspen sp (<i>Populus</i> sp) |
| 09A: Black Hawthorn (<i>Crataegus douglasii</i>) | 23A: Purple Leaf Plum (<i>Prunus cerasifera</i>) |
| 09B: English Hawthorn (<i>Crataegus monogyna</i>) | 23X: Plum sp (<i>Prunus</i> sp) |
| 10A: Mount Buffalo Gum (<i>Eucalyptus mitchelliana</i>) | 24: Coast Douglas-fir (<i>Pseudotsuga menziesii</i> var. <i>menziesii</i>) |
| 10B: Snow Gum (<i>Eucalyptus pauciflora</i>) | 25A: California Live Oak (<i>Quercus agrifolia</i>) |
| 10C: Spinning Gum (<i>Eucalyptus perriniana</i>) | 25B: Downy Oak (<i>Quercus pubescens</i>) |
| 11: European Beech (<i>Fagus sylvatica</i> var. <i>Purpurea</i>) | 25C: English Oak (<i>Quercus robur</i>) |
| 11A: Pendulous European Beech (<i>Fagus sylvatica</i> var. <i>Purpurea pendula</i>) | 25D: Garry Oak (<i>Quercus garryana</i>) |
| 12: European Ash (<i>Faxinus excelsior</i>) | 25E: Northern Red Oak (<i>Quercus rubra</i>) |
| 13: Skyline Honey Locust (<i>Gleditsia tricanthos inermis</i> var. <i>Skyline</i>) | 25X: Oak sp (<i>Quercus</i> sp) |
| 14: Common Juniper (<i>Juniperus communis</i>) | 26: Staghorn Sumac (<i>Rhus typhina</i>) |
| 15: Golden Tree (<i>Koeleria paniculata</i>) | 27X: Elderberry sp (<i>Sambucus</i> sp) |
| 16: Western Larch (<i>Larix occidentalis</i>) | 28: Giant Sequoia (<i>Sequoiadendron giganteum</i>) |
| 17: Bay Leaf Laurel (<i>Laurus nobilis</i>) | 29: European Mountain Ash (<i>Sorbus aucuparia</i>) |
| 18X: Apple sp (<i>Malus</i> sp) | 30: Western Red Cedar (<i>Thuja plicata</i>) |
| 19: Empress Tree (<i>Paulownia tomentosa</i>) | 31A: Mountain Hemlock (<i>Tsuga mertensiana</i>) |
| 20A: Black Spruce (<i>Picea mariana</i>) | 31B: Western Hemlock (<i>Tsuga heterophylla</i>) |
| 20B: Colorado Blue Spruce (<i>Picea pungens</i>) | 32A: American White Elm (<i>Ulmus americana</i>) |
| 20C: Engelmann Spruce (<i>Picea engelmanni</i>) | 32B: Siberian Elm (<i>Ulmus pumila</i>) |
| 20D: Norway Spruce (<i>Picea abies</i>) | 33: Maidenhair Tree (<i>Ginkgo biloba</i>) |
| | 34: California Lilac (<i>Ceanothus thyrsiflorus</i>) |

Guide to the David Douglas Trail

1 Western Larch

Start your walk on the David Douglas trail here at point 1 on the map, beside a western larch (*Larix occidentalis*) planted in 1994 by the Victoria Heritage Tree Society. Western larch are native to valleys and lower slopes of mountains in the southern Okanagan and Kootenay regions of British Columbia.

A few steps away is a rock cairn dedicated to the memory of David Douglas. Mr. Douglas made the first systematic collection of flora and fauna in the Pacific Northwest and named more than 200 species in the region. The cairn was dedicated on June 4, 1999, by His Honour Garde Gardom, a former Lieutenant Governor of British Columbia.

2 Poplar Plantation

These poplar trees were planted in 1996 as part of a pathology study that looked at the natural spread of a mite associated with leaf bronzing. Most of the remaining trees are hybrid poplar crosses, *Populus trichocarpa* X *P. deltoides* (TXD), and are now grown in commercial plantations in British Columbia. Under good soil and moisture conditions, they far surpass their parents in growth.

Next to the poplars is a large patch of salal (*Gaultheria shallon*) planted in 2000. Salal is an evergreen shrub, native to the west coast of British Columbia and North America, and used by both landscapers and florists. During reforestation, salal competes for water and nutrients with conifer seedlings and young trees and can significantly threaten their survival, presenting a serious challenge to reforestation. Salal is resistant to control by mechanical and chemical means, so PFC researchers developed a naturally occurring fungus (*Valdensinia heterodoxa*) as a potential biological control agent.

Past the salal sits a large Douglas-fir disk, cut by Pacific Forest Products (now TimberWest Forest Products) at Williams Creek near Port Renfrew. The tree was 834 years old when it was cut.

3 Douglas-fir

Laminated root rot, caused by the fungus *Phellinus weirii*, is the most serious root disease affecting Douglas-fir (*Pseudotsuga*

menziesii) in coastal British Columbia. These Douglas-fir trees are from a family suspected to have some tolerance to the fungus. These trees were inoculated with *P. weirii* and monitored for their reactions to the fungal inoculum.

The pile of logs in the background were recovered from sediments at the bottom of Heal Lake when it was drained in 1992. Scientists with the PFC, the Royal British Columbia Museum, and the University of Victoria studied the variation and width of the growth rings as a record of past climate events over time. The rings also tell us the logs are between 2,000 and 10,000 years old.

4 Meteorological Tower

The fenced compound houses a 23-m meteorology tower. Its primary use is for field calibrating and testing instruments before they are installed in remote locations. It is also used to provide environmental information for onsite research studies and supplementary data as part of the Environment Canada weather monitoring network.

5 Garry Oak

To the left of the trail is a good example of the native Garry oak (*Quercus garryana*) tree, which grows in the open parklands and meadows of southeastern Vancouver Island and the Gulf islands. Nearby can be seen a small lodgepole pine (*Pinus contorta*) plantation. Its name comes from its use in the construction of lodges by First Nations peoples.

6 Research Trees

The trail winds through a grove of trees representing a wide range of species that have been planted over the years for various research trials at the PFC. They range from native Sitka spruce (*Picea sitchensis*), Ponderosa pine (*Pinus ponderosa*) and Douglas-fir to more exotic species

such as Monterey pine (*Pinus radiata*), which is native to the Monterey Peninsula of central California, and Scots pine (*Pinus sylvestris*) from Europe.

7 Giant Redwood

The tree to the left of the trail is a giant redwood, (*Sequoiadendron giganteum*), native to the Sierra Nevada Mountains of California. It is extremely drought resistant and in its native habitat can grow to a height of more than 95 m.

8 Variety of Trees

The trees planted in rows downhill from this marker consist of a wide variety of exotic and native species, most of which were planted in the 1990s.

The composting area on the right side of the trail recycles all of the grass clippings and other plant “waste” material from the PFC grounds into nutrient-rich compost for the flower and shrub beds at the PFC.

9 Wildlife Tree

Both sides of the trail show dense patches of several shrub species, including common snowberry (*Symphoricarpos albus*), wild rose (*Rosa nutkana*), and common hawthorn (*Crataegus monogyna*), a cultivated European species that has become naturalized since its introduction to Vancouver Island. Compare this introduced hawthorn with the native species, black hawthorn (*Crataegus douglasii*), found by the parking lot at the start of the trail. The remains of larger grand fir (*Abies grandis*) now supports wildlife.

10 Les McMullen Memorial Plantation

Downhill is the Les McMullen Memorial Plantation established in 1994 mainly from clonal Sitka spruce originally planted to test resistance to spruce weevil (*Pissodes strobi*). This weevil is the most damaging plantation pest in the province. Its larvae grow in the inner bark of the lead shoot and kill it. The first two rows are from a previous plantation and were planted in 1987. Rows 15 and 16 contain black (*Picea mariana*), white (*Picea glauca*) and Norway (*Picea abies*) spruces. Row 17 originally included western white pine (*Pinus monticola*), which have since died and been replaced with clonal poplars.

11 Spruce Weevil Experiment

The fenced compound once protected experiments that required outdoor conditions. The cages inside the compound have been used to rear spruce weevil for study. Some cages were large enough to allow whole trees to be grown inside them. A *Ribes* (wild currant) garden for the inoculation of western white pine with white pine blister rust (*Cronartium ribicola*) is planned for the site. *Ribes* species are the alternate plant hosts for this damaging rust fungus.

12 Garry Oak Habitat

The rocky knoll to the right of the trail shows the type of open parkland and meadow typical of Garry oak (*Quercus garryana*) habitat found on southern Vancouver Island. Garry oak and associated ecosystems are among the most endangered in Canada. Once common in coastal areas of southwest British Columbia, less than 5 percent of these ecosystems remain in near-natural condition. This habitat is under increasing pressure from urban development and the encroachment of other species as seen by the Amabilis fir (*Abies amabilis*) (growing around a Garry oak), common hawthorn, and Scottish broom present on this site.

On top of the embankment you will see examples of Eucalyptus species native to Australia. These include *Eucalyptus mitchelliana*, *Eucalyptus pauciflora*, and *Eucalyptus perriniana*.

13 Ponderosa Pine

The pines at the trail junction are Ponderosa pine (*Pinus ponderosa*), named by David Douglas because of their ponderous size. They are native to the Okanagan and southern interior of British Columbia. The rhododendrons planted under the pines include examples of the native Pacific rhododendron (*Rhododendron macrophyllum*, pink flowering) from Rhododendron Flats in Manning Park. This species is also found in very small patches near Shawnigan Lake and Parksville on Vancouver Island. It is the state flower of Washington. As well, several ornamental rhododendrons (Cunningham, a white flowering cultivar) grow along the side of the trail under the Douglas-firs.

14 National Forest Inventory Plot

This stop represents a National Forest Inventory (NFI) ground plot (one-half the area of a regular NFI plot). The trees are tagged, but the tags are difficult to see from the trail. These plots are assessed every 10 years to monitor tree growth and mortality, stand volume, total above-ground biomass, plant diversity, and soil carbon. The above-ground biomass of trees in this plot was 174 tonnes per hectare in 2014.

The NFI provides information about change in Canada’s forests and forest ecosystems. The information meets Canada’s national and international reporting commitments. Learn more at <https://nfi.nfis.org>.

Follow the path past this block of trees and turn right before entering the forest.

15 Douglas-fir Forest

The David Douglas Trail now enters the Douglas-fir forest. At the entrance you can see examples of Indian plum (*Oemleria cerasiformis*), common snowberry (*Symphoricarpos albus*), and Sitka alder (*Alnus viridis*). Douglas-fir grows to be the tallest tree in British Columbia. (up to 90 m). The strong durable wood from this tree is used for construction lumber.

16 Alien Invasive Species: English Ivy

This spot illustrates the problem of introducing alien species into the natural ecosystems of southern Vancouver Island. Although there are no native ivy species in British Columbia, the imported English ivy (*Hedera helix*) has become established in many areas. At this location, it is climbing several of the Douglas-firs and has the potential to engulf them completely.

You can access Colquitz Creek Regional Park here by taking the trail going downhill. The David Douglas Trail continues along the hillside.

17 Bigleaf Maple Stump

The original bigleaf maple (*Acer macrophyllum*) that grew from this stump has died and rotted away, probably because either severe wind or wet snow broke the stem. The bigleaf maple is shade tolerant and frequently grows under larger Douglas-fir. This tree species was at the centre of coastal aboriginal culture, offering transportation, housing, clothing, tools, rope, baskets, and many medicines.

18 Red-barked Trees

The red-barked trees on either side of the path at this site are arbutus (*Arbutus menziesii*). Arbutus is the only native broadleaf evergreen tree in Canada. It is restricted to a narrow band along the south coast of British Columbia in dry or rocky areas.

The larger Douglas-fir trees located downhill from this site exhibit the classic “old growth” characteristics of their species. These are exemplified by sparseness in the foliage and a “flattening” of the top of the tree (with large branches extending almost to the top). These characteristics occur at younger ages in drier and rockier locations.

19 Monterey pine

This Monterey pine (*Pinus radiata*), which was planted in 1971, shows the vigour and growth that this species is famous for in its adopted New Zealand home. Large branches are common on this species when it is grown in favourable conditions.

20 Western Red Cedar

The native western red cedar (*Thuja plicata*) is British Columbia’s official tree. It grows best in moist conditions; it is tolerant of shade and frequently grows under larger Douglas-firs. This tree was central to coastal aboriginal culture, providing transportation, housing, clothing, tools, rope, baskets and many medicines.

21 Scouler Willow

This spot highlights Scouler willow (*Salix scouleriana*) and several deciduous shrubs and trees. Other species found here include red alder (*Alnus rubra*), cascara (*Rhamnus purshiana*) (behind the willow), and Garry oak. First Nations peoples used willows for many purposes, and it is the natural precursor to aspirin because of the salicylic acid found in its leaves and bark. Himalayan blackberry (*Rubus armeniacus*), a species introduced from India via England, is so well naturalized that it dominates the vegetation over the next portion of the trail.

Looking left (before reaching the next point), you will see a twin Douglas-fir. This tree lost its top (leader) when it was just a few years old. Two branches then took over the lead, producing a twin tree.

22 Douglas-fir Stump

The stump is from a Douglas-fir cut down in the mid-1980s. After the tree was cut, the stump continued to grow, producing the callused growth around the top of the stump. This was caused by root grafts between this tree and the surrounding Douglas-firs, which supplied nutrients to the stump after the tree was felled. Root grafting is quite common in Douglas-fir and can transmit some diseases, as well as nutrients, between trees.

23 Red Alder

Red Alder is a native species that quickly becomes established in disturbed areas and can outgrow other shrubs and trees. It is relatively short-lived (40–60 years) and is valuable for its ability to put nitrogen back into the soil in a form that can be used by other plants. It is also a good fuel for smoking foods.

24 Exotic and Native Species

This area contains a wide variety of exotic and native species, most of which were planted in either 1971 or 1983. These include Japanese maple (*Acer palmatum*), white spruce, Douglas-fir, and Sitka spruce.

25 English Oak Trees

Moving to the grassy area between the parking lot and the road to the left, you will find some English oak trees (*Quercus robur*) that were planted in the 1990s. Ahead you will see numerous other trees planted along the ridge.

26 Michael Edmunson Memorial

The Pacific dogwood (*Cornus nuttalli*) on the right was planted in 2014 as a memorial for PFC staff member Michael Edmunson. Further along, several areas on the right are planted with a variety of native trees, shrubs, and perennials. These include hairy manzanita (*Arctostaphylos columbiana*), red flowering currant (*Ribes sanguinem*), Oregon grape (*Mahonia*

aquifolium), mock orange (*Philadelphus lewisii*), Pacific ninebark (*Physocarpus capitatus*), Ocean spray (*Holodiscus discolor*), entire-leaved gumweed (*Grindelia interfolia*), and showy aster (*Aster conspicuus*).

You may also get the chance to see many of the following birds: American robin, Anna’s hummingbird, Bewick’s wren, brown creeper, bushtit, Canada goose, chestnut-backed chickadee, Chipping sparrow, dark-eyed junco, downy woodpecker, European starling, fox sparrow, glaucous-winged gull, golden-crowned kinglet, great horned owl, house finch, house sparrow, northwestern crow, red-breasted nuthatch, red-shafted northern flicker, red-tailed hawk, rock pigeon, ruby-crowned kinglet, spotted towhee, and turkey vulture.