Pavelic Park Overview

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Cover: One of the resident eagles of Pavelic Park (photo by Sasha Plotnikoff).

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1. Acknowledgments

Pavelic Park is situated on the ancestral and unceded lands of the BOḰEĆEN (Pauquachin), MÁLEXEŁ (Malahat), W̱JOŁEŁP (Tsartlip First Nation), and W̱SÍḴEM (Tseycum) First Nations of the W̱SÁNEĆ Peoples. We are grateful for the opportunity to conduct our research here and acknowledge that we are settlers who benefit from the use of these lands. We express our gratitude for this privilege, and look forward to further learning and collaboration with the W̱SÁNEĆ Peoples, the long-time caretakers of these lands.

We are grateful for the assistance and guidance provided by many individuals and communities during this research project. Thank you to Jay McGowan for providing us with modern aerial imagery to gain insight into forest structure. Thank you to Hally Hofmeyr for support with soil analysis and insights into the park. We appreciate Neil Hughes for providing instruction on mensuration data collection, as well as insights into Pavelic's forest structure and history. We also express our appreciation for the BOḰEĆEN First Nation for their guidance and review of this report.

This report would not have been possible without the support of Friends of North Saanich Parks (FNSP). Thank you to Tim Hatfield for assisting with mensuration and soil pit data collection, to Mark Brownlie for leading the wildlife inventory and reviewing this report, and to Anne Zerrath for her enthusiasm and support. Finally, thank you to Sharon Hope for her extensive research coordination and guidance throughout the project.

2. Abstract

As mature Douglas-fir (*Pseudotsuga menziesii*) forests face threats from anthropogenic disturbance and global phenomena such as climate change, it is vital to not only conserve areas of mature forest but also assist in the recovery and preservation of these forests in the face of disturbance. This study aims to provide a comprehensive inventory and review of the site, vegetation, and soil characteristics of Pavelic Park. The park was classified into three different zones: the Mature Zone (MZ), Transition Zone (TZ), and the Open Zone (OZ), with five different Terrestrial Ecosystem Mapping (TEM) ecosystem units: DSf7bmC, DSf5tM, DDf5sC, DSFf3bhM, and WDf4iM. Although the species richness, abundance, and distribution differed

across zones, invasive species were prevalent throughout the entirety of the park. Overall, trends in the vegetation and soil conditions indicate Pavelic Park is experiencing edge effects from Ardmore Dr. and other impacts from gradual changes in environmental and biological conditions. The park is also recovering from a disturbance event sometime between 1957 and 1964. As the effects of climate change exacerbate the impacts of invasive species on native vegetation, it is imperative to develop comprehensive land management plans. We provide a list of recommendations for the ecosystem management and restoration of Pavelic Park in Section 7.

3. Introduction

Pavelic Park falls into the Coastal Douglas-fir moist maritime (CDFmm) biogeoclimatic zone in accordance with the Biogeoclimatic Ecosystem Classification (BEC). The CDFmm has a range of structural stages, including mature Douglas-fir (*Pseudotsuga menziesii*) forests, such as the one found within Pavelic Park. This is rare across the CDFmm subzone, as well as within North Saanich (Fairbarns 2004; Government of BC, 2026; Madrone Environmental Services LTD., 2008; Nuzdorfer et al, 1991). Mature CDFmm forests provide vital ecosystem services and cultivate biodiversity, having implications for parklands like Pavelic Park (Brandt et al., 2013; Case et al., 2023; Hähn et al., 2026).

The CDFmm is small, occupying less than 0.3% of British Columbia (BC), and is located in the rain-shadow of Vancouver Island and the Olympic Mountains. Because of its geographic location, this subzone has a uniquely warm and mild sub-Mediterranean microclimate that supports rare assemblages of species of significant conservation focus. Most commonly, forests in the CDFmm are dominated by Douglas-fir (*Pseudotsuga menziesii*), and depending on the soil and nutrient conditions, are accompanied by western red cedar (*Thuja plicata*), grand fir (*Abies grandis*), arbutus (*Arbutus menziesii*), Garry oak (*Quercus garryana*), and red alder (*Alnus rubra*). Shrub species such as salal (*Gaultheria shallon*), dull Oregon-grape (*Mahonia nervosa*), and oceanspray (*Holodiscus discolour*) typically dominate the understorey (Fairbarns 2004; Madrone Environmental Services LTD., 2008; Nuzdorfer et al, 1991).

Soils in the CDFmm are predominantly within the Brunisolic Order (Nuzdorfer et al., 1991), in accordance with the Canadian System of Soil Classification (Soil Classification Working Group, 1998). Brunisolic soils typically develop under a forest cover and can be distinguished by their brownish coloured B (Bm) horizon. Within this Order, soil texture ranges from gravel to clay, and as a result, soil drainage ranges from imperfectly to rapidly draining (Smith et al., 2011).

Most of the mature forests within the CDFmm subzone have been removed or altered due to logging, human settlement, fire suppression, and agricultural use, making it the most disturbed subzone within BEC (Fairbarns 2004; Madrone Environmental Services LTD., 2008; Nuzdorfer et al, 1991). These disturbances can create abrupt edge effects, altering the structure and processes of ecosystems along the boundaries of a newly defined habitat. The interactions at the point where an ecosystem meets a habitat edge are driven by factors such as increased sunlight and temperatures, higher wind exposure, and the creation of new habitat conditions or microclimates (Chen et al., 1999; Harper et al., 2005; Morgan & Jucker, 2025). Environmental conditions can also change within forests due to natural processes and gradual transitions from one microclimate to the next. The meeting and integration of different ecological communities are due to transitions between ecosystems. When assessing ecosystem disturbance, it is important to consider the macro-level edge effects and the micro-level transition areas (Chen et al., 1999; De Frenne et al., 2021).

The CDFmm also faces threats from invasive species and climate change (Fairbarns, 2004; Madrone Environmental Services LTD., 2008; Nuzdorfer et al, 1991). The changing annual temperature and precipitation cause native plant communities to adapt to conditions outside of their ecological tolerances. These changing conditions also facilitate the proliferation of invasive species that further impact these already sensitive ecosystems by competition for resources (Albright & Peterson, 2013; Oakes et al., 2014; Skurski et al., 2014). The conservation of mature forests can help preserve the structure and biodiversity of these ecosystems, but more management is needed to restore these ecosystems to a state in which they are resilient to invasive species and climate change (Hähn et al., 2026; Pradhan et al., 2023).

Long-term, adaptable, and active management and monitoring can assist in the restoration and persistence of old-growth characteristics within forests. Although ecosystems may not be able to be restored to a baseline of conditions prior to climate change and invasive species colonization, the overall health and trends of ecosystems can be maintained with management efforts (Case et al., 2023; Hähn et al., 2026).

FNSP functions to restore and care for select parks within the District of North Saanich, British Columbia. FNSP's primary method for conservation is the removal of invasive species. This removal aids in the restoration of natural ecosystems, which is essential to preserving the biodiversity of native species across North Saanich. The goal of this report is to provide a comprehensive document that outlines our observations of Pavelic Park and to provide a starting point for ecosystem management and restoration.

4. Methodology

4.1 Study Area

Pavelic Park is located within the ancestral and unceded lands of the W̱SÁNEĆ First Nations, specifically the BOḰEĆEN nation. These eight hectares of land were privately owned by Myfanwy Pavelic and then bequeathed to the District of North Saanich following her death, with the stipulation that it be held without disturbance for the next 25 years. FNSP gained access to this park for restoration purposes in 2026.

The park is located on the north side of Coles Bay, about 200 m inland and 20 m above sea level. Ardmore Dr. runs along the south and west borders, while residences border the north and east of the park. The park transitions from a mature stand on the far west to an open canopy system near the far eastern border. Thus, the park was classified into three ecological zones: Mature Zone (MZ), Transition Zone (TZ), and Open Zone (OZ). Each section of the park was visited prior to data collection to determine plots in areas that were representative of vegetation, topography, hydrology, and disturbance extent.

4.2 Methods

Data collection took place from May to July 2026 following protocols outlined in *Describing Terrestrial Ecosystems in the Field, 2nd Edition* (B.C. Ministry of Forests and Range & B.C. Ministry of Environment, 2010). One assessment plot was established in each zone of the park, totalling three plots within the park. Each plot measured 20 x 20 m. At each plot, site characteristics were recorded, including, but not limited to, moisture and nutrient regime, surface topography, and substrate cover. Percent cover of vegetation was estimated for each plot, along with determining the density and distribution of each species in accordance with the Government of BC's IAPP database. Since English ivy (*Hedera helix*) is classified as a vine, we decided to categorize the invasive into its own category. Its percent cover was separated by its growth along the ground and its vertical establishment on trees. Soil pits were dug and described for each plot within the plot boundaries. Classification for each soil pit was in reference to the B.C. Soil Survey Map. Mensuration was carried out within the MZ and TZ plots, but was not eligible for completion in the OZ due to the dense shrub layer and insufficient tree canopy. Tree age could not be calculated during this period of study due to site restrictions. A wildlife inventory was recorded throughout May to July, with a bird-specific inventory taking place on July 3rd with Mark Brownlie.

Site associations for the MZ and TZ were determined following the Madrone Environmental Services Ltd. Expanded Terrestrial Ecosystem Mapping (TEM) Legend (2008). Associations for the OZ did not fall under any predetermined associations outlined by Madrone; associations were determined by describing the dominant tree and shrub species, or the dominant shrub and herb species in areas of open canopy. Terrestrial ecosystem maps were created following the Standards for TEM (Resource Inventory Committee, 1998).

5. Results

Through our analysis of each zone, we found that the MZ and TZ have one ecosystem unit each, while the OZ has three ecosystem units. As seen in Figure 1, the MZ zone has a DSf7bmC ecosystem unit, the TZ has a DSf5tM ecosystem unit, and the OZ has ecosystem units DDf5cC, DSFc3bhM, and WDf4iM. A full description of these ecosystem units can be found in Table 1.

Figure 1. Terrestrial ecosystem map, highlighting the different sections and ecosystem units of Pavelic Park. From left to right, the MZ with a DSf7bmC ecosystem unit, the TZ with the DSf5tM ecosystem unit, and the OZ with the DDf5sC, DSFf3bhM, and WDf4iM ecosystem units marked with a dashed line. Orthoimagery courtesy of the District of North Saanich.

Table 1. TEM Ecosystem units of Pavelic Park.

<table>
<tr>
<td colspan="3">1. DSf7bmC
DS: Douglas-fir–salal
f: Fine-textured soil
7b: Very old forest
m: Multi-storied stand
C: Coniferous-dominated stand</td>
<td colspan="3">2. DSf5tM
DS: Douglas-fir–salal
f: Fine-textured soil
5: Young forest
t: Two-storied stand
M: Mixed stand composition modifier</td>
</tr>
<tr>
<td colspan="2">3. DDf5sC
DD: Douglas-fir–Red osier dogwood
f: Fine-textured soil
5: Young forest
s: Single-storied stand
C: Coniferous-dominated stand</td>
<td colspan="2">4. DSFf3bhM
DSF: Dogwood–Western swordfern
f: Fine-textured soil
3b: Tall shrub (2-10m)
h: Shelterwood structural stage modifier
M: Mixed stand composition modifier</td>
<td colspan="2">5. WDf4iM
WD: Willow–Red osier Dogwood
f: Fine-textured soil
4: Pole/sapling structural stage
i: Irregular structural stage modifier
M: Mixed stand composition modifier</td>
</tr>
</table>

5.1 Mature Zone

5.1.1 Site Characteristics

The vegetation, topography, and hydrology were uniform across the entire MZ. There is an established deer trail that runs through the park, as seen in Figures 1 and 2, but edge effects from this path are seemingly negligible. There was a gentle downward slope present across the entirety of this zone, facing SSW. The entirety of this zone had slightly hummocked terrain; the forest floor fluctuated 0.3-1 m in height due to organic material deposits, most likely decomposed fallen logs. Most trees with a diameter at breast height (DBH) of greater than 50 cm were growing atop organic material. According to BEC, this old climax forest presented a mesic moisture regime and a rich nutrient regime. A minute amount of conifer regeneration occurred in the MZ only along the border with the TZ. More details regarding site characteristics can be found in Table 2.

Figure 2. The deer trail that runs through the mature forest of Pavelic Park. Photo: Carmen Harrold.

Table 2. MZ site characteristics at established plot site.

Site Characteristic	
Elevation	20 m
Plot Slope	3%
Plot Aspect	220° SSW
Site Slope	1%
Site Aspect	220° SSW
Meso Slope Position	Level
Surface Topography	Slightly hummocked
Moisture Regime	Mesic
Nutrient Regime	D – Rich

Site Characteristic	
Successional Status	OC – Old Climax
Structural Stage	Cm 7b – Coniferous-dominated, multi-storied Very Old Forest
Substrate	90% Organic matter, 10% decayed wood
Disturbance	Invasive species (Bv)
Plot Centre	48°37'50" N, 123°28'36" W
General Site Location	48°37'49" N, 123°28'37" W

5.1.2 Vegetation

Within the MZ, a total of 30 plant species were present. Figure 3 demonstrates the vegetation structure of the plot. This mature stand was dominated by Douglas-fir, making up the dominant and co-dominant layers of the canopy. Grand fir appeared in the main canopy layer, as well as the sub-canopy and tall shrub layers. These two species made up 66% cover for the tree layer. A single bigleaf maple (*Acer macrophyllum*) was found in our plot, within the B2 layer.

Salal dominated the shrub layer. Other species, such as common snowberry (*Symphoricarpos albus*), baldhip rose (*Rosa gymnocarpa*), short Oregon grape, and trailing blackberry (*Rubus ursinus*) were also prevalent within the shrub layer. Other native species present in the plot were osoberry or June plum (*Oemleria cerasiformis*), oceanspray, orange honeysuckle (*Lonicera ciliosa*), pink honeysuckle (*Lonicera hispidula*), creeping snowberry (*Symphoricarpos mollis*), red huckleberry (*Vaccinium parvifolium*), cascara buckthorn (*Frangula purshiana*), and saskatoon serviceberry (*Amelanchier alnifolia*). Invasive species were present in this layer, including English holly (*Ilex aquifolium*), spurge-laurel or daphne (*Daphne laureola*), and Portuguese laurel (*Prunus lusitanica*). The shrub layer covered 90% of the MZ plot, with invasives making up 5.5% of the layer.

The herbaceous layer was very sparse, only covering 10% of the plot. Native and invasive plant species were found within the herbaceous layer. Native species included western swordfern (*Polystichum munitum*), bracken fern (*Pteridium aquilinum*), broadleaf starflower (*Lysimachia latifolia*), Alaskan oniongrass (*Melica subulata*), crinkle-awn fescue (*Festuca subuliflora*), and American trailplant (*Adonocaulon bicolor*). Only one invasive herbaceous species was found: broadleaf helleborine (*Epipactis helleborine*), and it covered only 1% of the herbaceous layer.

Oregon beaked moss (*Kindbergia oregana*) was the most abundant moss in the moss/lichen/seedling layer. Oak moss (*Evernia prunastri*) was also present. Two lichens were present within the plot: varied rag lichen (*Plastimatia glauca*) and beard lichen (*Usnea* sp.). These species covered 30% of the plot.

English ivy covered 40% of the plot, with ground cover being 35% and vertical cover being 5%. Out of the 30 species in the MZ, five were invasive. A summary of prevalent species can be found in Table 3.

There is only one ecosystem unit in MZ: DSf7bmC. While there were species present that did not fall under the old forest stage of typical TEM Douglas-fir–salal forests, the dominant vegetation suggests this association is the primary one within the MZ.

Figure 3. View from the west side of the MZ plot. Photo: Carmen Harrold

Oceanspray is a less frequent species present within Douglas-fir–salal forests. Within our plot, it accounted for only four percent of the shrub layer. We found that oceanspray throughout the MZ mainly grew in pockets underneath an opening in the canopy, as seen in Figure 4.

Western redcedar was not present within the MZ plot and was not regularly distributed throughout the mature forest, but a cedar grove was present along the north edge of the park within the MZ and TZ.

Figure 4. Areas of canopy opening within the MZ, allowing species such as *H. discolor* to grow. Photo: Sasha Plotnikoff

Table 3. Prevalent vegetation within the MZ plot. Species in the tree, shrub, and additional species layers are listed if percent cover was 5% or more, while species in the herb and moss/lichen layers are listed if percent cover was 2% or more.

A. Tree Layer	B. Shrub Layer	C. Herb Layer	D. Moss/Lichen	E. Additional Species
Douglas-fir (*Pseudotsuga menziesii*)	Salal (*Gaultheria shallon*)	Bracken fern (*Pteridium aquilinum*)	Oakmoss (*Evernia prunastri*)	English ivy (*Hedera helix*), ground cover[1]
Grand fir (*Abies grandis*)	Common snowberry (*Symphoricarpos albus*)	Western swordfern (*Polystichum munitum*)	Varied rag lichen (*Plastimatia glauca*)	English ivy (*Hedera helix*), vertical growth[1]
	Baldhip rose (*Rosa gymnocarpa*)		Oregon beaked moss (*Kindbergia oregana*)	
	Oregon grape (*Berberis nervosa*) or (*Mahonia nervosa*)			
	Trailing blackberry (*Rubus ursinus*)			

[1]Non-native species

5.1.3 Mensuration

Due to the multi-storied stand nature of the MZ, the canopy was relatively closed, except in natural areas of opening (Figure 4). All the crowns of the trees within the mensuration plot were healthy; even though the tops of half the measured trees were damaged or broken, the crowns were full. The crowns of all *A. grandis* trees in the lower A2, A3, and B1 layers were suppressed, while all of the crowns of *P. menziesii* were dominant or co-dominant in the A1 and A2 layers. The *A. grandis* trees were smaller in diameter and height than the *P. menziesii* trees. The largest and tallest tree was #4, a Douglas-fir with a DBH of 161.2 cm and a height of 56.4 m. Only three trees had conks on them, all of them being mature *P. menziesii* trees. Four out of twelve trees displayed evidence of scarring, all on the bases of the trees. The origin of scarring could not be determined except for the fallen tree scar on tree #6. Woodpecker impact could be seen on most of the old Douglas-firs.

Branch retention occurred on every tree within the mensuration plot, mostly in the upper two-thirds or the entire tree. Tree #4 had significant retention of its long lower branches (Figure 5). More details regarding mensuration data can be found in Table 4.

Figure 5. Branch retention on tree #4.

Photo: Sasha Plotnikoff

Table 4. Mensuration data collected at the MZ plot. Included trees were determined using a 6 BAF prism.

Tree #	Species	DBH (cm)	Height (m)	Crown Class	Tree Class	D. or B. Top	Comments
1	Bg	32.4	29.2	S	8	No	Ivy load, lost apical dominance
2	Fd	129.8	49.9	D	5	Yes	Conk in middle third of tree
3	Fd	63.6	28.6	S	5	Yes	Fork in lower third, woodpecker impact
4	Fd	161.2	56.4	D	5	Yes	Conk and scar in lower third, woodpecker impact
5	Fd	127.5	52.0	D	5	Yes	Woodpecker impact
6	Fd	146.7	51.6	D	5	Yes	Conk and fallen tree scar in lower third, woodpecker impact

Tree #	Species	DBH (cm)	Height (m)	Crown Class	Tree Class	D. or B. Top	Comments
7	Bg	47.3	29.8	S	5	No	
8	Fd	120.7	43.7	D	5	No	Scar in lower third, woodpecker impact
9	Fd	75.0	43.9	C	5	Yes	Woodpecker and insect impact
10	Fd	122.0	53.6	D	5	No	Woodpecker and insect impact, significant ivy load
11	Fd	150.8	53.1	D	5	No	Woodpecker and insect impact
12	Fd	116.4	47.9	D	5	No	Scar in lower third, woodpecker impact, ivy load

5.1.4 Soil Analysis

The soil pit for the mature section of the park was dug to a depth of 0.5 m within the MZ plot in an area of representative vegetation and topography at 48° 37' 49.764" N and 123° 28' 36.0114" W. The soil within this area was determined to be an Orthic Sombric Brunisol with an Ah layer 11 cm deep, a Bm layer 11-23 cm in depth, a Bmgj layer 23-45 cm deep, and a Cg layer 45+ cm deep. The Bmgj layer had light mottling while the Cg layer had abundant mottling. Further description of soil pit characteristics can be found in Table 5. A deposit of charcoal was found in the Bm layer, approximately 15 cm deep (Figure 6).

Figure 6. Charcoal deposit found in the Bm layer (left), and soil horizons of the MZ soil pit (right). Photo: Sasha Plotnikoff

Table 5. Relevant soil characteristics of the MZ plot. Full soil pit data can be found in Appendix D. The soil pit was excavated at a level position with an elevation of 20 m.

Horizon	Depth (cm)	Colour	Text-ure	Coarse Fragments	Roots	Root Pores	Structure	Consistence/ Comments
LF	-1-0	Douglas-fir cones and needles, twigs and branches, and deciduous leaves. No measurable humus layer.						
Ah	0-11	10YR 4/3	SiCL	5% gravels, 5% cobbles	Plentiful fine, few medium	Few fine and medium	Fine subangular blocky	Dry, loose (1), non-plastic. Irregular horizon boundaries with Bm layer
Bm	11-23	10YR 4/4	SiCL		Few fine,	Few fine and	Medium subangular	Dry, soft (2), slightly

Horizon	Depth (cm)	Colour	Text-ure	Coarse Fragme nts	Roots	Root Pores	Structure	Consistence/ Comments
					medium, and coarse	medium	blocky	plastic. Charcoal present in this layer
Bmgj	23-45	10YR 5/3	SiC		Few fine and medium	Few fine, very few medium and coarse	Medium subangular blocky	Dry, soft (2), slightly plastic. Light mottling, colour of 10YR ⅝
Cg	45+	10YR 6/1	SiC		Few medium	Few very fine	Medium subangular blocky	Dry, hard (4), slightly plastic. Consistent mottling, colour of 10YR ⅝

5.2 Transition Zone

5.2.1 Site Characteristics

The Transition Zone is the mid-zone of the gradient from a mature forest to a shrub-dominated area on the east side of the park. The TZ was still dominated by Douglas-fir, but had a far more open canopy. The vegetation in this zone was a mixture of the MZ and OZ. Across the TZ, vegetation, topography, and hydrology were fairly uniform, except for a depression near the border with the MZ. The TZ plot was placed farther east to avoid this topographic variance. There was a slope facing south that stretched across this zone. The terrain was moderately hummocked, and mounds of organic material 0.3-1 m high were spaced 3-7 m apart. This maturing seral forest displayed a mesic moisture regime and a rich nutrient regime, similar to the MZ. Conifer regeneration of grand fir and western redcedar occurred sporadically throughout the TZ, but not within the confines of the TZ plot. Table 6 outlines more site characteristics of the TZ.

Table 6. TZ site characteristics at the established plot site.

Site Characteristic	
Elevation	20 m
Plot Slope	4%
Plot Aspect	170° S
Site Slope	6%
Site Aspect	165° S
Meso Slope Position	Level
Surface Topography	Moderately hummocked
Moisture Regime	Mesic
Nutrient Regime	D – Rich
Successional Status	MS – Maturing Seral
Structural Stage	Mt 5 – Mixed stand, two-storied, Young Forest
Substrate	88% Organic matter, 10% decayed wood, 2% mineral soil
Disturbance	Invasive species (Bv)
Plot Centre	48°37'49" N, 123°28'31" W
General Site Location	48°37'50" N, 123°28'31" W

5.2.2 Vegetation

Thirty-six species were present in the TZ plot. Figure 7 displays the vegetation within the TZ. This section of the park was dominated by Douglas-fir, which made up the upper level of the canopy (A1 and A2). The lower canopy level was made up of grand fir, Western redcedar, bigleaf maple, red alder, and Scouler's willow (*Salix scouleriana*). Western redcedar, red alder, and Scouler's willow occupied the A3 layer, while grand fir, bigleaf maple, and some red alder trees occupied the B1 layer. There was one Garry Oak sapling within the TZ plot. The tree layer covered 40% of the plot.

Figure 7. Typical vegetation of the TZ, highlighting the tall shrub layer and cedar regeneration. Photo: Carmen Harrold

The shrub layer covered 90% of the plot, with salal once again making up the majority of the layer. Other native species were trailing blackberry, oceanspray, common snowberry, orange honeysuckle, baldhip rose, creeping snowberry, and red osier dogwood (*Cornus sericea*). Invasive species were more abundant in this zone, comprising 22% of the shrub layer. Present invasive species included Himalayan blackberry (*Rubus armeniacus*), Franchet's cotoneaster (*Cotoneaster franchetii*), tutsan (*Hypericum androsaemum*), and daphne laurel. Himalayan blackberry was the most prominent invasive, covering 15% of the plot. The plants comprising the shrub layer were typically taller and denser than in the MZ plot.

The TZ had the most diversity in the herbaceous layer, with a total of 12 different species covering 23% of the plot. Native species included western swordfern, bracken fern, Pacific sanicle (*Sanicula crassicaulis*), lady fern (*Athyrium filix-femina*), Columbia brome (*Bromus vulgaris*), catchweed bedstraw (*Galium aparine*), western fescue (*Festuca occidentalis*), giant horsetail (*Equisetum telmateia*), deer fern (*Blechnum spicant*), and fringed willow herb (*Epilobium ciliatum*). Invasive species include orchard grass (*Dactylis glomerata*) and creeping buttercup (*Ranunculus repens*), and make up approximately 3.5% of the plot.

The moss/lichen/seedlings layer comprised 34.5% of the TZ plot. Oregon beaked moss covered 30% of the plot. The only other moss species present in the plot was *Polytrichum* sp., covering 2%. Seedlings of red alder and red osier dogwood were both present within the plot. No lichens were able to be identified.

Eight out of 36 species were invasive. English ivy covered 30% of the plot, with ground cover being 10% and vertical cover being 20%. A summary of prevalent species within the TZ plot can be found in Table 7.

The one ecosystem unit found in the TZ was DSf5tM. The species typical for Douglas-fir–salal forests were less abundant in the TZ, but characteristic species such as Douglas-fir, grand fir, western redcedar, bigleaf maple, salal, trailing blackberry, oceanspray, common snowberry, orange honeysuckle, baldhip rose, and creeping snowberry still indicate this as the dominant association. The species listed are typically present in a range of growth stages of Douglas-fir–salal forests, rather than later stages of growth like in the MZ.

Oceanspray occupied more of the TZ plot than the MZ plot, covering 10% and 4%, respectively. Within the TZ, oceanspray grew taller and bushier, as seen in Figure 8.

Figure 8. A tall oceanspray plant growing in direct sunlight. Photo: Sasha Plotnikoff

Table 7. Dominant vegetation within the TZ plot. Species in the tree, shrub, and additional species layers are listed if percent cover was 5% or more, while species in the herb and moss/lichen layers are listed if percent cover was 2% or more.

A. Tree Layer	**B. Shrub Layer**	**C. Herb Layer**	**D. Moss/Lichen**	**E. Additional Species**
Douglas-fir (*Pseudotsuga menziesii*)	Salal (*Gaultheria shallon*)	Western swordfern (*Polystichum munitum*)	Oregon beaked moss (*Kindbergia oregana*)	English ivy (*Hedera helix*), ground cover[1]
Red alder (*Alnus rubra*)	Himalayan blackberry (*Rubus armeniacus*)[1]	Lady fern (*Athyrium filix-femina*)	*Polytrichum* sp.	English ivy (*Hedera helix*), vertical growth[1]
Scouler's willow (*Salix scouleriana*)	Trailing blackberry (*Rubus ursinus*)	Fringed willowherb (*Epilobium ciliatum*)		
	Oceanspray (*Holodiscus discolor*)	Creeping buttercup (*Ranunculus repens*)[1]		
	Red osier dogwood (*Cornus sericea*)			
	Orange honeysuckle (*Lonicera ciliosa*)			

[1]Non-native species

5.2.3 Mensuration

Of the trees within the TZ mensuration plot, Douglas-fir made up the tall, dominant layer, including A1 and A2, and grand fir made up the suppressed, lower canopy of B1. All of the crowns of measured trees were healthy. Four out of seven trees had broken or damaged tops. The TZ displayed a wider variety of sizes and heights of trees than in the MZ, with the smallest tree, a grand fir measuring 18.9 cm in diameter and 9.9 m tall. The largest tree was a Douglas-fir, 101.1 cm in diameter, and a different Douglas-fir was the tallest at 41.8 m. Four out of seven

trees had a significant ivy load, as can be seen in Figure 9. No trees displayed signs of infection or scarring. All trees had rotten branches, often up the entirety of the tree; however, the degree of branch retention was nowhere near the amount in the MZ. Often just the bases of the branches remained, and not the length of the branch. A full summary of mensuration data can be viewed in Table 8.

Figure 9. Significant ivy load on an open stand of Douglas-fir. Photo: Sasha Plotnikoff

Table 8. Mensuration data collected at the TZ plot. Included trees were determined using a 3 BAF prism.

Tree #	Species	DBH (cm)	Height (m)	Crown Class	Tree Class	D. or B. Top	Comments
13	Bg	18.9	9.9	S	8	Yes	Ivy load
14	Fd	101.1	38.7	D	5	Yes	Ivy load, big burrel on tree at ~1.5 m
15	Fd	50.5	NA	D	5	No	Ivy load affected DBH, significant lean prevented tree height calculation
16	Fd	65.7	41.8	D	5	Yes	Fork in upper third of tree
17	Fd	72.7	30.5	D	5	Yes	Fork in upper third of tree, ivy load
18	Fd	97.0	41.3	D	5	No	Woodpecker impact
19	Fd	87.0	37.4	D	5	No	

5.2.4 Soil Analysis

The TZ soil pit was dug to a depth of 0.5 m in an area representative of vegetation and topography at 48° 37' 48.972" N 123° 28' 31.404" W. The soil was also determined as an Orthic Sombric Brunisol. The Ah layer was 14 cm deep, the Bm1 layer was 14-21 cm deep, the Bm2 layer was 21-38 cm deep, and the Cgj was 38+ cm. Figure 10 shows the TZ soil pit horizons. In contrast to the MZ soil pit, the TZ Bm layers did not have any mottling. The mottling in the Cgj layer was more inconsistent compared to the MZ. Table 9 provides relevant soil pit characteristics.

Figure 10. Soil pit horizons for TZ. Photo: Carmen Harrold

Table 9. Relevant soil characteristics of TZ plot. Full soil pit data can be found in Appendix D. The soil pit was excavated at a level position with an elevation of 20 m.

Horizon	Depth (cm)	Colour	Text-ure	Coarse Fragments	Roots	Root Pores	Structure	Consistence/ Comments
LF	-1.5-0	Medium and coarse twigs, salal leaves, and Douglas fir cones.						
Ah	0-14	10YR 4/3	SiC	5% gravels, 5% cobbles, 5% stones	Plentiful very fine and medium, few fine and coarse	Plentiful fine, few medium	Medium subangular blocky	Dry, slightly hard (3), non-plastic. Irregular horizon boundaries with Bm layer
Bm1	14-21	10YR 4/3	SiCL	5% gravels	Plentiful fine, few medium,	Plentiful fine, few medium	Medium subangular blocky	Dry, slightly hard (3), non-plastic

Horizon	Depth (cm)	Colour	Text-ure	Coarse Fragments	Roots	Root Pores	Structure	Consistence/ Comments
					very few coarse			
Bm2	21-38	10YR 4/4	SiCL		Few fine, medium, and coarse	Few fine and medium	Medium subangular blocky	Dry, slightly hard (3), non-plastic
Cgj	41+	10YR 5/3	SiCL		Very few very fine	Few very fine	Medium subangular blocky	Dry, hard (4), plastic. Light mottling, colour of 10YR ⅚.

5.3 Open Zone

5.3.1 Site Characteristics

The Open Zone is the largest area of the park, taking up 3.6 ha of the 8 ha total. Since the OZ has three ecosystem units, vegetation, topography, and hydrology differ throughout this zone. The separation of the TZ and the OZ is delineated by the landmark of a long-term bald eagle's nest atop a Douglas-fir. On the east side of this tree, the vegetation and topography start to drastically differ from the TZ, thus determining the beginning of a new zone in the park. One of the major indicators of the OZ is the lack of salal throughout the entire zone.

The plot was chosen in an area that represented the shrub-dominant vegetation, as at the time it was thought to be the largest ecosystem unit in the OZ. Later, it was determined that this area was the smaller DSFf3bhM ecosystem unit. In the general vicinity of the plot, site characteristics were determined (Table 10). A slope facing south was present. This area exhibited little to no changes in topography. This portion of the park was determined to be in an early seral successional stage with a subhygric moisture regime and a very rich nutrient regime. We observed no conifer regeneration within this zone. A significant amount of dead wood material was suspended within the shrub layer, but was not contributing to the substrate.

Table 10. OZ site characteristics at established plot location.

Site Characteristic	
Elevation	20 m
Plot Slope	6%
Plot Aspect	220° SSW
Site Slope	6%
Site Aspect	180° S
Meso Slope Position	Level
Surface Topography	Microsmooth
Moisture Regime	Subhygric
Nutrient Regime	E – Very Rich
Successional Status	YS – Young Seral
Structural Stage	M 3b – Mixed stand, tall shrub
Substrate	95% Organic matter, 5% decayed wood
Disturbance	Invasive species (Bv)
Plot Centre	48°37'49" N, 123°28'28" W
General Site Location	48°37'50.52" N, 123°28'25.76" W

5.3.2 Vegetation

The OZ plot had 21 total species present. This section of the park had no dominant tree canopy. There were individual trees present in the area, but not enough to form a distinct tree canopy. Within the OZ plot, tree species accounted for 24% of the total cover. No trees occupied the A1 or B2 layers. This was the first instance where introduced tree species were present: cherry plum (*Prunus cerasifera*) and English hawthorn (*Crataegus monogyna*). Cherry plum occupied the A3 layer, while English hawthorn was present in the B1 layer. Douglas-fir was present only in the A2 layer, while Bigleaf maple and Western redcedar were present in the A2 and A3 layers. Red alder occupied the A3 and B1 layers. There were no seedlings of any tree species present in this plot.

The shrub layer created the main canopy for this section, as seen in Figure 11. The shrub layer was predominantly red osier dogwood, often completely enclosing this area. Additional native species included common snowberry, trailing blackberry, red huckleberry, Nootka rose (*Rosa nutkana*), and creeping snowberry. Invasive shrub species comprised 23% of the plot. These species included Himalayan blackberry and daphne laurel. Altogether, the shrub layer covered 81% of the plot.

The herb layer within the plot was severely reduced in diversity and extent compared to the MZ and TZ, only covering 20% of the OZ plot. Herbs were often found in patches. The two species present were both native: western swordfern and giant horsetail. There were no invasive herbaceous species within the OZ plot.

Multiple moss species were present in the plot, including Oregon beaked moss, tree mat moss (*Homalothecium fulgescens*), and Lyell's bristle moss. One lichen species was present: tree lungwort (*Lobaria pulmonaria*). In total, this layer covered 60% of the plot.

English ivy was prevalent throughout the plot, totalling 35% cover. Ground cover was 20%, while vertical cover was 15%. Out of 21 total species, five were invasive. Table 11 provides a summary of the dominant vegetation.

Figure 11. Red osier dogwood dominated the canopy. Photo: Sasha Plotnikoff

Table 11. OZ plot dominant vegetation species. Species in the tree, shrub, and additional species layers are listed if percent cover was 5% or more, while species in the herb and moss/lichen layers are listed if percent cover was 2% or more.

A. Tree Layer	B. Shrub Layer	C. Herb Layer	D. Moss/Lichen	E. Additional Species
English hawthorn (*Crataegus monogyna*)[1]	Red osier dogwood (*Cornus sericea*)	Western swordfern (*Polystichum munitum*)	Oregon beaked moss (*Kindbergia oregana*)[2]	English ivy (*Hedera helix*), ground cover[1]
Cherry plum (*Prunus cerasifera*)[1]	Himalayan blackberry (*Rubus armeniacus*)[1]	Giant horsetail (*Equisetum telmateia*)	Tree lungwort (*Lobaria pulmonaria*)[2]	English ivy (*Hedera helix*), vertical growth[1]
	Trailing blackberry (*Rubus ursinus*)		Tree mat moss (*Homalothecium fulgescens*)[2]	
	Daphne laurel (*Daphne laureola*)[1]		Lyell's bristle moss (*Orthotrichum lyellii*)[2]	

[1]Non-native species

[2]Cover was considered if the species was present on the ground and on tree stems below 1 m

5.3.3 Soil Analysis

The soil pit in the OZ was dug 0.55 m deep in an area that represented the vegetation and topography of the area. The exact soil pit location was 48° 37' 48.3594" N, 123° 28' 27.4794" W. This soil was determined to be an Orthic Sombric Brunisol, like the MZ and TZ, although it is important to note their differences. The Ah layer was 0-27 cm deep, the Bmgj layer was 27-52 cm deep, and the Cg layer was 52+ cm deep. Figure 12 shows the OZ soil pit horizons. The Ah and Bmgj layers were much darker in colour compared to the MZ and TZ soils. The Bmgj layer had light and inconsistent mottling, while the Cg layer had consistent mottling. Relevant soil pit characteristics can be found in Table 12.

Figure 12. Nearby soil pit area and soil pit horizons for OZ soil pit. Photo: Carmen Harrold

Table 12. Relevant soil characteristics of the OZ plot. Full soil pit data can be found in Appendix D. The soil pit was excavated at a level position with an elevation of 20 m.

Horizon	Depth (cm)	Colour	Text-ure	Coarse Fragments	Roots	Root Pores	Structure	Consistence/ Comments
LF	-2-0	Ivy leaves, small twigs and branches, deciduous leaves.						
Ah	0-27	7.5YR 2/0	SiL	5% gravels	Few very fine and medium, very few coarse	Very few very fine, few fine	Coarse subangular blocky	Moist, very friable (2), non-plastic
Bmgj	27-52	10YR 3/2	SiC		Few very fine and fine	Few very fine, very few fine	Coarse subangular blocky	Moist, firm (4), slightly plastic. Infrequent mottling, 10YR 4/6.

Horizon	Depth (cm)	Colour	Text-ure	Coarse Fragme nts	Roots	Root Pores	Structure	Consistence/ Comments
								Clay films present
Cg	52+	10YR 4/2	SiC				Coarse subangular blocky	Moist, friable (3), slightly plastic. Frequent and distinct mottling, 10YR 4/6

5.3.4 Ecosystem Units

DDf5sC

This ecosystem unit surrounds the northern and eastern edges of the OZ, as seen in Figure 1. There is an established canopy of Douglas-fir that makes up this single-storied stand, as can be seen in Figure 13. The understorey is dominated by red osier dogwood. This coniferous-dominated stand was determined to be in the young forest seral stage.

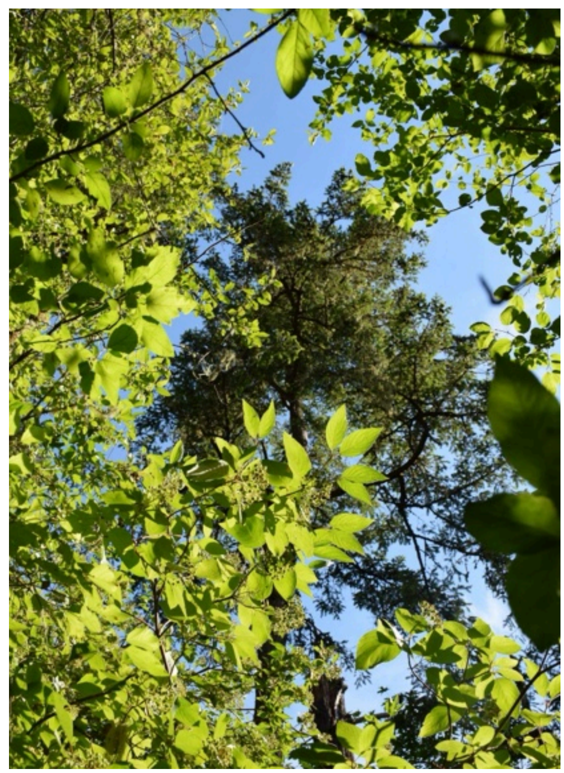

Figure 13. Douglas-fir and red osier dogwood making up the canopy for the DDf5sC. Photo: Sasha Plotnikoff

DSFf3bhM

This ecosystem unit was represented within all of the plot data for the OZ. Dominated by red osier dogwood and western swordfern, it is within the tall shrub seral stage. Due to the occurrence of individual trees, its canopy is neither dominated by conifers nor broadleaf trees, leading to a mixed stand composition. Figure 14 shows the dominant vegetation within this ecosystem unit.

Figure 14. Red osier dogwood canopy and western swordfern in the DSFf3bhM.

WDf4iM

Willow (*Salix* sp.) and red osier dogwood were the dominant tree and shrub species present in this ecosystem unit. It was determined to be in the pole/sapling structural stage, with an irregular canopy, meaning an open overstorey with intermediate crown classes, as well as a well-established suppressed crown class. English ivy often dominated the forest floor (Figure 15), leaving little to no herbaceous species growing in this zone. Due to the presence of a few Douglas-firs, this stand had a mixed stand composition, as can be seen in Figure 15.

Figure 15. Understorey (left) and stand structure (right) for the WDf4iM ecosystem unit.

5.4 Cut Stumps

Throughout all zones of the park, the upper halves or upper thirds of some trees were gone. Distance from the road seemingly did not have an influence; trees were topped in all depths of the park. Examples can be seen in Figure 16.

Figure 16. A hairy woodpecker perched atop a cut tree in the MZ (left). Turkey vulture on a cut tree in the TZ (right). Photo: Sasha Plotnikoff

On the corner of Ardmore Dr at the southwest corner of the park, a grand fir was cut down in May 2026 (Figure 17). DBH was 91.0 cm, and it was estimated at approximately 147 years old. Another grand fir was cut down at the north end of the deer trail and was estimated at 120 years old with a DBH of 53.1 cm. Due to these trees' locations on the edge of the park, their structure and age likely do not directly reflect the nature of the mature trees within the park; however, these were the only two trees that were aged.

Figure 17. A recently felled tree on the southwest corner of the park along the corner of Ardmore Dr. Photo: Carmen Harrold

Within the cedar grove at the north end bordering the MZ and TZ, four stumps were evident, three of which can be seen in Figure 18. Their respective trunks were nearby, and the rate of decay seemingly matched the rate of decay of the stumps. These were the only other cut stumps found throughout the 8 ha of the park.

Figure 18. Three cut stumps within a cedar grove. Photos: Sasha Plotnikoff

5.5 Wildlife Inventory

A wildlife inventory was conducted for the entire extent of the park. Wildlife observations of fauna were noted throughout the duration of data collection. The bird inventory that took place on July 3rd yielded 18 species of birds. Table 13 outlines all observed species in the park. Figure 19 displays two sets of faunal remains found in the TZ.

Table 13. Wildlife inventory of fauna seen throughout data collection from May to July.

Date	Species	Count
Recurring	American Crow (*Corvus brachyrhynchos*)	10+
Recurring	American Robin (*Turdus migratorius*)	5+
July 3rd	Anna's Hummingbird (*Calypte anna*)	1
Recurring	Bald eagle (*Haliaeetus leucocephalus*)	2+
July 3rd	Bewick's Wren (*Thryomanes bewickii*)	6
July 3rd	Brown-headed Cowbird (*Molothrus ater*)	1
July 3rd	Brown Creeper (*Certhia americana*)	2
July 3rd	Cedar Waxwing (*Bombycilla cedrorum*)	1
Recurring	Chestnut-backed Chickadee (*Poecile rufescens*)	15+
Recurring	Columbian Black-tailed Deer (*Odocoileus hemionus* ssp. *columbianus*)	2+
July 3rd	Hairy Woodpecker (*Leuconotopicus villosus*)	1
July 3rd	House Finch (*Haemorhous mexicanus*)	2
July 3rd	Pine Siskin (*Spinus pinus*)	1
July 3rd	Rufous Hummingbird (*Selasphorus rufus*)	1
May 16	North American River Otter (*Lontra canadensis*)	1
Recurring	Spotted Towhee (*Pipilo maculatus*)	7+
July 3rd	Swainson's Thrush (*Catharus ustulatus*)	1
Recurring	Turkey Vulture (*Cathartes aura*)	5+
July 3rd	Violet-green Swallow (*Tachycineta thalassina*)	1
July 3rd	Western Wood-Pewee (*Contopus sordidulus*)	1

Note: two sets of faunal remains were found in the TZ.

Figure 19. Two sets of faunal remains found within the TZ. Photo: Sasha Plotnikoff, Carmen Harrold

5.6 Cultural Significance to Local First Nations

There are numerous traditional food and medicinal plants present within Pavelic Park. These include baldhip rose, nootka rose, oceanspray, salal, Oregon grape, western swordfern, common snowberry, osoberry, bigleaf maple, and western red cedar (Turner & Hebda, 2012; Camosun College, n.d.). As of this report, there were no observed culturally modified trees present within the park.

To date, there were no confirmed archaeological indicators present. The charcoal found within the MZ soil pit (Figure 6) may be an indicator of First Nations presence; however, further research and discussion with First Nations is required to confirm this.

6. Discussion

6.1 Native Vegetation & Soil Trends

Pavelic Park displays a gradient from a mature Douglas-fir forest to an open canopy area dominated by red osier dogwood. This gradient in succession is reflected in the vegetation, as seen with the presence, abundance, and distribution of both invasive and native species throughout the park. The general tree cover within each assessment plot also contributes to this gradient. Tree cover decreases from the west end to the east end of the park; MZ had 66% tree cover, TZ had 40% tree cover, and OZ had 24% tree cover.

Invasive species are prevalent throughout the park, but the species, abundance, and distribution differ throughout each zone of the park (see section 6.3). Similarly, the native vegetation also displays a trend of change across the site. Starting in the MZ, typical Douglas-fir–salal type forest species are present, such as Douglas-fir, grand fir, salal, common snowberry, and western swordfern, to name a few. These species decrease in abundance transitioning eastward to the OZ, and some of these species disappear altogether while others appear for the first time (Tables 3, 7, and 11).

The OZ differs drastically in vegetation composition and structure from the MZ and TZ; the most significant vegetation change being the loss of salal that is characteristic of Douglas-fir–salal forests and of most mature forests throughout the CDFmm (Fairbarns, 2004; Madrone Environmental Services LTD, 2008; Nuszdorfer et al., 1991). This zone lacks a main tree canopy layer, with red osier dogwood comprising the canopy, specifically for the DSFf3bhM ecosystem unit. This ecosystem unit also has a highly reduced herbaceous layer, with only two species present: western swordfern and giant horsetail.

While the TZ has the highest number of invasive species, this zone also has the highest number of native vegetation, making it the most diverse zone of the park with 36 species. The TZ hosts the highest amount of red alder, a pioneer plant species that is significant due to its nitrogen fixation, boosting the amount of usable nitrogen in the soil (Compton et al., 2003; Nuszdorfer et al., 1991). The species present in the TZ are typically present in a range of growth stages of Douglas-fir–salal forests, rather than in exclusively later stages of growth. The presence of older Douglas-fir stands and younger pioneer species such as red alder indicates this zone has multi-aged stands (Madrone Environmental Services LTD, 2008). This is also supported by the presence of grand fir and western redcedar regeneration throughout the TZ. Conifer regeneration in Pavelic can signify forest recovery following a disturbance event, whether it was natural or anthropogenic (Harper et al., 2005; Martin et al., 2020). This regeneration occurring exclusively in the TZ indicates the successional path for the TZ may be similar to the structure of the MZ

(Harper et al., 2005; Morgan & Jucker, 2025). Reflected in its name, this zone acts as a transition from a mature Douglas-fir forest to an open canopy zone.

This gradient can also be seen in the soil structure. The presence of red osier dogwood alludes to the OZ having more water present in the soil throughout the year, compared to the MZ and TZ (Lutz et al., 2014; Madrone Environmental Services LTD, 2008). This phenomenon is supported by the structure of the soil: mottling below 20 cm, wet soil for a significant part of the growing season, dark coloured organic matter, and fine soil texture (BC MFR & BC MOE, 2010). The variation in soil and vegetation structure in the OZ from the MZ and TZ indicates that a single or multiple disturbance events have greatly influenced the ecosystem processes in this area of Pavelic, or the succession of this section possibly aligns with a different ecosystem than a mature Douglas-fir forest (BC MFR & BC MOE, 2010; Chen et al., 1991).

6.2 Potential Factors Impacting Pavelic Park

Previous disturbances can create edge effects and transitional environmental conditions that dictate biodiversity patterns and ecosystem structure (De Frenne et al., 2021; Harper et al., 2005; Morgan & Jucker, 2025). A significant edge effect acting on Pavelic Park is the presence of Ardmore Dr. For example, along the road edge there are several Garry Oak trees that are not distributed anywhere else throughout the park. Another example is linear edges from fragmentation altering habitats for species such as birds, providing different nesting and feeding opportunities (Flaspohler et al., 2001).

The rest of Pavelic Park undergoes a transition from a mature Douglas-fir forest to the early successional OZ. The gradient of these ecosystems is likely caused by the meeting and integration of different ecological communities, creating microclimates. In addition to edge effects, these microclimates allow for new niches to be filled as habitats are created or modified (Chen et al., 1999; De Frenne et al., 2021; Harper et al., 2005). An example of a microclimate conducive to species suited to particular environments is the cedar grove at the north end of the park along the MZ and TZ border. Western redcedar is typically found within maturing and later-stage Douglas-fir–salal forests and prefers cool temperatures, high soil moisture, nutrient-rich soils, and partial shade (Madrone Environmental Services LTD, 2008). Since there is a pocket of cedar at the north end of the park and it is not regularly distributed through the MZ, it can be assumed that these environmental conditions are occurring as a microclimate

(Harper et al., 2005; Morgan & Jucker, 2025). Fauna may utilize different microclimates, sheltering in an area such as the MZ and feeding in an open canopy forest such as the TZ (De Echeverria & Thornton, 2019; Lee & Rudd, 2003).

The increased sun exposure in an open canopy boosts primary production, increasing the total amount of available energy in the ecosystem (Brandt et al., 2013; Gray et al., 2016; Luyssaert, 2008). This is reflected in the TZ, where the canopy opens from the closed mature Douglas-fir forest in the MZ. The TZ has higher species richness than the MZ or OZ. However, more sun exposure can also increase the temperature of the soil and decrease the soil's capacity for water retention (Pham et al., 2023; Schneider & Goss, 2011). This is reflected in the abundance and distribution of oceanspray throughout the MZ and TZ. Oceanspray prefers drier, well-drained soils and open areas with full sun or partial shade (Madrone Environmental Services LTD, 2008; Pojar & MacKinnon, 1994). In the MZ, oceanspray typically occurs in areas of canopy opening. Within the MZ plot, oceanspray only covered 4% of the plot, and individuals were sporadically distributed, with one plant being present per square meter. In contrast, the oceanspray in the TZ covered 10% of the plot. While it was still sporadically distributed, the density of oceanspray increased to two to five plants per square meter. Due to the amount of light exposure influencing other vegetation, there cannot be a direct comparison between the oceanspray abundance and distribution in the MZ and TZ, but general trends can be examined.

Wind exposure can increase in transitional areas. Stronger winds hit forest edges, making trees more vulnerable to falling and incurring damage (Chen et al., 1999; De Frenne et al., 2021; Morgan & Jucker, 2025). There is an area along the MZ and TZ border containing numerous fallen trees. Since this site has not been examined over time, it is uncertain whether the windthrow area was created as a result of wind disturbance or if fallen trees created the windthrow, exacerbating the effects of wind exposure.

6.3 Invasive Plant Species Presence

Invasive plant species were prevalent throughout the entirety of the park, although their species richness, abundance, and distribution differed throughout the three different zones. In the MZ, five out of 30 total plant species present in the vegetation assessment were invasive. Three invasive species were shrubs: English Holly, daphne laurel, and Portuguese laurel. These invasives covered 5.5% of the 90% MZ shrub layer. Broadleaf helleborine and English ivy were the other two invasive species, with broadleaf helleborine covering 1% of the 10% herbaceous layer and English ivy covering 40% of the plot. English ivy cover was divided into ground and vertical cover, with values of 35% and 5%, respectively. The MZ had the highest amount of ground ivy cover, likely due to the restriction of light, causing the ivy to remain in its juvenile, horizontal growth phase (Melzer et al., 2010; Strelau et al., 2018).

The TZ had higher species richness and abundance in this section of the park compared to the MZ, with eight out of 36 species being invasive, as well as the shrub and herbaceous layer having increased cover of invasives. Species in the shrub layer included Himalayan blackberry, Franchet's cotoneaster, tutsan, and daphne laurel. These species comprised 22% of the total 90% shrub cover. Two invasive herbaceous species were present in the TZ, orchard grass and creeping buttercup, and covered 3.5% of the 23% herb layer cover. English ivy comprised 30% of the plot, 10% being ground cover and 20% being vertical cover. The TZ had the highest amount of vertical ivy cover compared to the MZ and OZ, possibly due to the increased light within the TZ as a result of the open canopy (Melzer et al., 2010; Strelau et al., 2018).

Within the OZ, two introduced species of trees were present: cherry plum and English hawthorn, covering 13% of the plot. No other zone had non-native tree species. The OZ shrub layer had the highest abundance of invasives, covering 23% of the plot. Invasive species included Himalayan blackberry and daphne laurel. There were no invasive herbaceous species in the OZ. English ivy covered 35% of the plot, with 20% being ground cover and 15% being vertical cover. Ivy dominated the ground in many areas, likely limiting the growth of herbaceous species, as can be reflected in the fact that only two herbaceous species were present and had a percent cover of 20% for the entire plot.

The TZ had the highest number of invasive species compared to the MZ and OZ; the TZ had eight invasive species while the MZ and OZ had five invasive species each. The TZ had a higher abundance of invasives than the MZ, with TZ total invasive cover being 55.5% compared to MZ's 46.5%. However, the OZ had the highest total invasive species cover of 71%. English ivy and daphne laurel were found throughout the entirety of the park; however, other species like English Holly, Portuguese laurel, and broadleaf helleborine were confined to the MZ. Similarly, the TZ and OZ had species that were found only within their respective plots. Himalayan blackberry was an abundant invasive, covering 15% each within the TZ and OZ, but was not found in the MZ. The density and distribution codes for each species in the three park zones can be found in Appendix B.

The reason for invasive plant species introduction into Pavelic Park is currently unknown. However, some likely causes are bird dispersal, active fragmentation of the landscape, and human disturbance that may have occurred in the past (refer to 6.3 Historic Features). Bird species commonly found in North Saanich, such as the American Robin (*Turdus migratorius*), are known dispersal agents because they consume the fruit of invasive plant species and disperse the seeds through their droppings (Renne et al., 2002; Gosper et al., 2005).

Although Pavelic Park has been relatively conserved, the area surrounding it has been developed into a mosaic of residential houses, roads, and walking trails. Habitat edges are known to facilitate the dispersal and establishment of invasive plants, ultimately altering plant community structure (Harper et al., 2005; Watling & Orrock, 2009). Habitat edges along the border of Pavelic Park are likely providing entry points for invasive plants found along the roadside or in nearby gardens to establish themselves within the park.

An alternative, or potentially complementary, explanation is past human disturbance that may have occurred within the park. The establishment and abundance of invasive species is highest in human-altered landscapes (González-Moreno et al., 2014). Therefore, a disturbance such as logging, agricultural tilling, or even heavy foot traffic in Pavelic Park likely provided a means for invasive plant establishment in the past.

In addition to bird dispersal, fragmentation, and potential human disturbance, it is likely that climate change has facilitated the dispersal and continued success of invasive plant species in Pavelic Park. Generally, invasive plants are competitively superior to native plant species because of specific traits that allow for rapid reproduction under non-limited resource conditions (Manea & Leishman, 2011; Skurski et al., 2014). Research indicates that in some cases, invasive plants have responded positively to climatic shifts such as increasing temperatures at higher latitudes (Wu et al., 2017), elevated atmospheric CO_2 concentrations (Manea & Leishman, 2011), and more severe drought conditions (LaForgia et al., 2020) in terms of competitive interactions with native plants. This is due to both high phenotypic plasticity in new environments, as well as relatively rapid genetic change that allows invasive plants to evolve to selective and sustained climatic pressures (Clements & Ditommaso, 2011). High phenotypic plasticity and evolutionary potential of invasive plants are a likely cause for their long-term success in Pavelic Park.

6.4 Historic Features

According to historical aerial imagery, a disturbance event occurred in the east end of the park sometime between 1957 and 1964. Previously entirely forested, the canopy opened after the disturbance in the TZ and OZ, specifically in the DSFf3bhM and WDf4iM ecosystem units of the OZ. The disturbance event can still be seen in modern aerial imagery (Figure 1). Evidence of this disturbance is supported within the vegetation communities present in these zones. Conifer regeneration only occurs after disturbance, whether natural or anthropogenic, and thus the presence of regeneration in the TZ supports the disturbance event (Harper et al., 2005; Martin et al., 2020; Morgan & Jucker, 2025). The stand structure in this area has been altered; trees occur individually or in small clusters, creating an open canopy where a substantial amount of light reaches the understorey (Majasalmi & Rautiainen, 2020; Senf & Seidl, 2020). No cut stumps were found in this area of canopy opening, so there is no direct evidence of selective logging. Further research is needed to determine the cause of this disturbance event.

Other historic features include the well-decayed cut stumps within the cedar grove at the MZ and TZ north border. Since these stumps are well decayed, these trees may have been cut related to the former farm to the north before the area was developed into a residential neighbourhood.

In terms of potential site history, the retention of long branches on tree #4 in the MZ suggests the tree was possibly one of the first trees to establish in the area. It likely grew without early lateral crowding, allowing the lower limbs to persist. Later-established trees in the MZ lost their lower branches due to shading and self-pruning (Ishii & McDowell, 2002; Seidel et al., 2016; Wardman & Schmidt, 1998). Further studies to age the trees within the park could confirm if tree #4 was present before the remaining forest was established.

More studies are needed to confirm the origins of this site to aid in management decisions. Due to the presence of Garry oak trees and seedlings in Pavelic Park, areas of the park may have been a Garry oak ecosystem. This indicates traditional W̱SÁNEĆ land practices were likely enacted within Pavelic Park. However, the origins and previous land use of this site are unknown to FNSP. Determining previous ecosystem structure and past land use can form historical baselines, which are useful to form effective conservation and restoration plans.

6.5 Broad Implications

Biodiverse ecosystems play an important role in maintaining species richness and ecosystem health, ecosystem services, and an aesthetic natural environment (Brandt et al., 2014; Duffy, 2008; Hähn et al., 2026; Rawat & Agarwal, 2015). Ecological assessments conducted in Pavelic Park reflect the high biodiversity of this site, revealing its immense ecological importance in North Saanich and the broader Saanich Peninsula region. Globally, the number of threatened species and ecosystems is increasing at an alarming rate. Although BC supports the greatest biodiversity of any province or territory in Canada, it is not exempt from increasing extinction rates (Westwood et al., 2019). Virtually all threats to species and ecosystems are a result of poor management of biological resources and climate change (Albright & Peterson, 2013; Oakes et al., 2014; Rawat & Agarwal, 2015), highlighting the importance of conserving Pavelic Park in its current ecological state rather than undergoing any major developments (see Section 7.1).

Although the entirety of Pavelic Park should be conserved, it is very important that major developments do not occur in the MZ in particular. In addition to fostering greater biodiversity than younger ecosystems (Hebda, 2007), mature forests sequester carbon dioxide (CO_2) from the atmosphere and store it in woody tissue and decomposing organic matter, serving as critical CO_2 sinks (Gray et al., 2016). However, it is likely that disturbing these forests will result in CO_2 moving back into the atmosphere (Luyssaert et al., 2008). By conserving the MZ of Pavelic Park, this will help support resilient ecosystems in the face of climate change and offset harmful anthropogenic inputs into the atmosphere.

6.6 Conclusion

Pavelic Park hosts a significant ecological area. These results confirm the transition from a mature Douglas-fir forest to an altered, open-canopy ecosystem. This is reflected in the variation in vegetation structure and community as well as in soil structure across the park. Native plant species in the MZ were characteristic of the presence and structure of mature Douglas-fir–salal forests, whereas native plant species in the OZ were not characteristic of Douglas-fir–salal forests or previously described TEM associations. Vegetation and soil structure within the OZ were indicative of an ecosystem with higher moisture and nutrient regimes than the MZ or TZ. The TZ presented as a transition from a mature Douglas-fir forest to the ecosystem units within the OZ. Since Pavelic Park is undergoing successional change as a result of an unknown disturbance event and is being affected by prevalent invasive species, it is imperative to develop comprehensive, adaptable, and ongoing management plans that will aid in the preservation and recovery of a mature Douglas-fir forest within North Saanich.

7. Recommendations

As Pavelic Park is an undeveloped park, there are numerous opportunities for reconciliation, collaboration, conservation, and restoration by the District of North Saanich and by other organizations depending on District approval. We provide a comprehensive list of suggestions for Pavelic Park, for both the long-term and short-term. We define long-term recommendations as goals that may take up to several years to implement and likely require intervention from the District. We define short-term recommendations as suggestions that can be implemented immediately and may not require intervention from the District of North Saanich.

We start with general suggestions, move into long-term recommendations outlined by the District of North Saanich and the Capital Regional District (CRD) that could potentially align with land management goals for Pavelic, and conclude with short-term recommendations that could be enacted by restoration organizations, such as FNSP.

7.1 General Recommendations

Firstly, we suggest that no major developments occur in Pavelic Park. This area is an important mature forest ecosystem, one that is becoming increasingly rare across the CDFmm due to anthropogenic developments and climate change. The main goal for Pavelic Park should be to protect and restore this significant ecosystem. If any developments are to be made, we recommend signage relating to First Nations influence and knowledge in the area, details of which are outlined in Section 7.2, and signage to encourage visitors to stay on the main deer trail and not disturb areas undergoing restoration (Figures 1 & 2). As there is not sufficient information to indicate whether Pavelic Park is an old-growth site based on our preliminary assessment, we recommend that steps are taken to determine if Pavelic Park is an old-growth forest. This will help influence ongoing management decisions and assist in potential research about old-growth forests within North Saanich.

7.2 Long-Term Recommendations

The suggestions outlined in this section are primarily inspired by the CRD's 2022-2032 Regional Parks and Trails Strategic Plan and the District of North Saanich's 2023-2026 Strategic Plan. Studies such as Case et al. (2023), DeMeo et al. (2018), Hähn et al. (2026), Pradhan et al. (2023), and Schille et al. (2019) have also informed our list of recommendations. Although all of the suggestions listed are of equal importance, we have ranked the suggestions in terms of priority.

1) *Reconciliation*

Reconciliation requires significant and purposeful actions from organizations and individuals to foster strong and genuine relationships with First Nations. Mutual respect, understanding, and benefit are essential to form these relationships. The actions we list for Pavelic Park are not exhaustive. Reconciliation and reciprocity require ongoing nurturing, and we encourage readers to search for additional ways to participate in reconciliation regarding park management.

We recommend first establishing connections with First Nations that may have been historically present within or nearby Pavelic Park. Communities such as the BOḰEĆEN (Pauquachin), MÁLEXEȽ (Malahat), W̱JOȽEȽP (Tsartlip First Nation), W̱SÍḴEM (Tseycum) First Nations and the larger W̱SÁNEĆ Peoples should be considered to connect with.

Next, we recommend collaborating with First Nations to co-develop and implement comprehensive management plans and knowledge-sharing initiatives to center First Nations worldviews and knowledge. First Nations need to receive compensation for their time, expertise, and shared knowledge. We present potential actions for collaboration with First Nations. Firstly, signage should be developed that recognizes traditional SENĆOŦEN place names, includes cultural contexts and ecological insights, and ensures park visitors understand the deep, ongoing connection of the W̱SÁNEĆ Peoples to this land. Other possible actions include collaboration to identify, monitor, and restore species of cultural significance; partnering with the W̱SÁNEĆ Peoples for restoration initiatives; centring Traditional Ecological Knowledge (TEK) by co-developing management plans with W̱SÁNEĆ communities; and developing means of sharing information and data without limiting the ability of traditional knowledge keepers to share their data within their own community.

2) *Conservation and Restoration*

To protect and restore the natural environment, we recommend creating management plans that center TEK. Collaborating with the W̱SÁNEĆ Peoples can lead to understanding and monitoring plants and animals that are culturally significant. Future park maintenance and invasive species management must prioritize the protection, monitoring, and active restoration of traditional species. Staff and associated volunteer organizations can gain adequate training to understand TEK and cultural influences within and surrounding Pavelic Park.

A regular review of the health and ecological values in Pavelic Park would assist in ongoing, adaptable, and active management plans to maintain ecosystem health and biodiversity. The conservation and preservation of Pavelic Park can be maintained by not making any major development within the park, implementing signage to reduce foot traffic in the park other than on the main deer trail, and through support of restoration initiatives. As of this park assessment, planting native species is not required. However, further research into the ecosystem history of the OZ may call for native species to be planted in accordance with a historical baseline.

3) *Climate Action and Resiliency*

We recommend considering mitigation of climate change threats when forming management plans. This means long-term, adaptable, and active land management plans for Pavelic Park. This park plays a role in carbon sequestration and maintaining biodiversity, but additional research on ecosystem services should be conducted to contribute to climate change management. The removal of invasive species is a direct action for mitigating climate change by reducing competition for nutrients and other resources. Regular monitoring and reporting are needed to observe the effects of climate change and take appropriate action to mitigate its effects.

4) *Monitoring and Reporting*

A regular review and report of goals pertaining to the previous three recommendations should be completed to monitor the health of the park and progress on initiatives. Data collected in collaboration with First Nations should be kept and shared at the discretion of their knowledge keepers. Other collected data should be publicly accessible.

5) Visitor Experience

To enhance visitor experience and promote ecosystem health, we recommend involving visitors in park stewardship. This park is integral to the Ardmore community; many members of the community use the park recreationally, enjoy the local wildlife, and intuitively monitor overall park health. Stewardship can be fostered through programs, knowledge sharing, and collaboration. In the case of FNSP already conducting restoration activities, their efforts can be supported by the District of North Saanich to facilitate further community involvement in their initiatives.

7.3 Short-Term Recommendations

The following set of recommendations can be easily implemented for restoration projects within Pavelic Park. Even though this section is listed as short-term, this does not mean the suggestions should be dropped once implemented. Restoration efforts never truly cease, so ongoing, consistent, and active management is needed.

We recommend restoration initiatives, such as FNSP, follow restoration guidelines such as the Society for Ecological Restoration's (SER) International Guidelines (2026) and local restoration plans, such as SER's Restoration in the Rainshadow (2005).

Before beginning restoration in Pavelic Park, we recommend organizations form clear and realistic goals. These goals must consider the scale of the project and be reached by consensus, as they are the most important aspect of a restoration project. We advise goals to be framed around considerations such as target plants to remove, projected timelines, historical baselines, and short-term and long-term strategies for management. These goals should be readily adaptable as restoration progresses.

When considering invasive plants to remove, we recommend creating or following a priority list for removals. These need to be agreed upon by the organization to ensure the success and rate of removals. We recommend following the Capital Region Invasive Species Partnership priority list.

We advise that an organization's impact on the natural features and vegetation of the park be limited. The amount, size, and permanence of trails should be limited to reduce edge effects within the park. The impact of gaining access to invasive species should not outweigh the impact of removing the invasive species themselves.

Orientation for best practices for newcomers and returning members needs to be implemented and reviewed. This can include techniques such as brushing off shoes and clothes between removal sessions and different parks, and cleaning tools and equipment in between parks and sensitive areas. Members should be taught and reminded of the seasonality of removals, mechanical extraction techniques, proper disposal protocol, prevention of bare soil exposure, and so forth. Each member should be properly educated and informed on invasive plant removal as well as general restoration practices.

We recommend natural succession when applicable. For Pavelic Park, we do not think any replication of natural succession is needed at this time. In terms of removals, we recommend focusing on the MZ before moving into other sections of the park to restore the mature forest and to consider the scale of restoration within the park.

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10. Appendix A – Site Assessments Raw Data

A.1. Mature Zone Site Assessment Raw Data

Date	5/16/2026	**Project ID**	Pavelic1_MZ	**Surveyor(s)**	SH, SP, CH
		LOCATION			
Forest Region	**UTM Zone**	**Site Latitude**	**Site Longitude**	**Plot Latitude**	**Plot Longitude**
RCO	10	48°37'49" N	123°28'37" W	48°37'50" N	123°28'36" W
		SITE INFORMATION			
Plot Representing			**BGC Unit**	**Moisture Regime**	**Nutrient Regime**
Mature forest, undisturbed, multi-stage development, Douglas-fir–salal type, ~25-year-old Douglas-fir (younger), ~175-year-old grand fir, ~700-year-old ancient Douglas-fir?			CDFmm	Mesic	D (rich)
Successional Status	**Structural Stage**	**Site Disturbance**	**Meso. Slope Position**	**Surface Topography**	**Exposure Type**
Old Climax (OC)	Coniferous-dominated, multi-storied Very Old Forest (Cm7b)	Invasives (Bv)	Level	Slight hummocked	NA
Site Elevation (m)	**Site Slope (%)**	**Site Aspect (°)**	**Plot Elevation (m)**	**Plot Slope (%)**	**Plot Aspect (°)**
20 m	1%	220° SSW	20 m	3%	220° SSW
		SUBSTRATE (%)			
Organic Matter	**Decayed Wood**	**Bedrock**	**Rocks**	**Mineral Soil**	**Water**
90%	10%	-	-	-	-

A.2. Transition Zone Site Assessment Raw Data

Date	6/4/2026	**Project ID**	Pavelic2_TZ	**Surveyor(s)**	CH, SP
		LOCATION			
Forest Region	**UTM Zone**	**Site Latitude**	**Site Longitude**	**Plot Latitude**	**Plot Longitude**
RCO	10	48°37'50" N	123°28'31" W	48°37'49" N	123°28'31" W
		SITE INFORMATION			
Plot Representing			**BGC Unit**	**Moisture Regime**	**Nutrient Regime**
Transition zone between mature forest and open zone. Potential selective logging ~60 years ago. Douglas-fir–salal type.			CDFmm	Mesic	D-rich
Successional Status	**Structural Stage**	**Site Disturbance**	**Meso. Slope Position**	**Surface Topography**	**Exposure Type**
Maturing Seral (MS)	Mixed stand, two-storied, Young Forest (Mt5)	Invasives (Bv)	Level	Moderately hummocked	NA
Site Elevation (m)	**Site Slope (%)**	**Site Aspect (°)**	**Plot Elevation (m)**	**Plot Slope (%)**	**Plot Aspect (°)**
20 m	6%	165° S	20 m	4%	170° S
		SUBSTRATE (%)			
Organic Matter	**Decayed Wood**	**Bedrock**	**Rocks**	**Mineral Soil**	**Water**
88%	10%	-	-	2%	-

A.3. Open Zone Site Assessment Raw Data

Date	5/20/2026	**Project ID**	Pavelic3_OZ	**Surveyor(s)**	CH, SP
		LOCATION			
Forest Region	**UTM Zone**	**Site Latitude**	**Site Longitude**	**Plot Latitude**	**Plot Longitude**
RCO	10	48°37'50.52" N	123°28'25.76" W	48°37'49" N	123°28'28" W
		SITE INFORMATION			
Plot Representing			**BGC Unit**	**Moisture Regime**	**Nutrient Regime**
Potential logging, disturbed section. Invasive plants are prevalent. Hawthorn–red osier dogwood association? Open canopy, shrub-dominant. Alder (N-fixer)			CDFmm	Subhygric	E – Very Rich
Successional Status	**Structural Stage**	**Site Disturbance**	**Meso. Slope Position**	**Surface Topography**	**Exposure Type**
Young Seral (YS)	Mixed stand, tall shrub (M3b)	Invasives (Bv)	Level	Microsmooth	NA
Site Elevation (m)	**Site Slope (%)**	**Site Aspect (°)**	**Plot Elevation (m)**	**Plot Slope (%)**	**Plot Aspect (°)**
20 m	6%	180° S	20 m	6%	220° SSW
		SUBSTRATE (%)			
Organic Matter	**Decayed Wood**	**Bedrock**	**Rocks**	**Mineral Soil**	**Water**
95%	5%	-	-	-	-

11. Appendix B – Vegetation Assessments Raw Data

B.1. Mature Zone Vegetation Assessment Raw Data

% COVER BY LAYER									
Tree (A)	**Shrub (B)**	**Herb (C)**	**Moss/Lichen (D)**	**Additional Species (E)**		**Surveyor(s)**		**Plot No.**	
66	90	10	30	40		SH, SP, CH		Pavelic1_MatureZone	
TREE LAYER (A)									
Species	**Density**	**Distribution**	A1	A2	A3	**A**	B1	B2	**B**
Pseudotsuga menziesii	1	4	15	5	0	20	0	0	0
Abies grandis	2	4	0	30	10	40	5	0	5
Acer macrophyllum	1	1	0	0	0	0	1	0	1
SHRUB LAYER (B)									
Species					**Density**	**Distribution**	B1	B2	**B**
Oemleria cerasiformis					1	1	2	0	2
Holodiscus discolor					1	4	4	0	4
Gaultheria shallon					2	8	0	40	40
Symphoricarpos albus					2	8	0	6	6
Berberis nervosa					2	6	0	8	8
Rosa gymnocarpa					2	6	2	4	6
Lonicera spp.					2	5	0	3	3

Rubus ursinus	2	8	0	10	10
Daphne laureola	2	5	0	2	2
Ilex aquifolium	2	5	0	3	3
Prunus lusitanica	1	1	0	0.5	0.5
Symphoricarpos mollis	1	1	0	1	1
Vaccinium parvifolium	1	4	0	3	3
Frangula purshiana	1	2	1	0	1
Amelanchier alnifolia	1	1	0	0.5	0.5

HERB LAYER (C)

Species	Density	Distribution	%
Pteridium aquilinum	2	5	3
Lysimachia latifolia	2	5	1
Epipactis helleborine	1	2	1
Melica subulata	1	1	1
Festuca subuliflora	2	3	1
Adonocaulon bicolor	2	3	1
Polystichum munitum	1	2	2

MOSS/LICHEN/SEEDLINGS (D)

Species	Density	Distribution	%
Evernia prunastri	1	4	2
Plastimatia glauca	1	4	2
Usnea sp.	1	4	1
Kindbergia oregana	4	8	25

ADDITIONAL SPECIES (E)

Species	Density	Distribution	%	Layer
Hedera helix (ground)	3	8	35	herb
Hedera helix (vertical)	1	4	5	tree

B.2. Transition Zone Assessment Raw Data

% COVER BY LAYER									
Tree (A)	Shrub (B)	Herb (C)	Moss/Lichen (D)	Additional Species (E)		Surveyor(s)		Plot No.	
40	90	23	34.5	30		CH, SP		Pavelic2_TransitionZone	
TREE LAYER (A)									
Species	**Density**	**Distribution**	A1	A2	A3	**A**	B1	B2	**B**
Pseudotsuga menziesii	1	2	5	5	0	10	0	0	0
Abies grandis	1	1	0	0	0	0	3	0	3
Thuja plicata	1	1	0	0	3	3	0	0	0
Acer macrophyllum	1	1	0	0	0	0	3	0	3
Alnus rubra	1	4	0	0	10	10	5	0	5
Salix scouleriana	1	1	0	0	5	5	0	0	0
Quercus garryana	1	1	0	0	0	0	0	1	1
SHRUB LAYER (B)									
Species					**Density**	**Distribution**	B1	B2	**B**
Gaultheria shallon					2	8	0	30	30
Daphne laureola					2	3	0	2	2
Rubus armeniacus					2	6	10	5	15
Rubus ursinus					2	6	0	8	8
Holodiscus discolor					2	4	10	0	10

Cornus sericea	2	4	7	0	7
Symphoricarpos albus	2	5	2	1	3
Cotoneaster franchetii	1	1	2	0	2
Hypericum androsaemum	2	3	0	3	3
Lonicera spp.	2	6	0	5	5
Rosa gymnocarpa	1	4	2	2	4
Symphoricarpos mollis	1	1	0	1	1

HERB LAYER (C)

Species	Density	Distribution	%
Polystichum munitum	2	6	8
Sanicula crassicaulis	2	3	0.5
Dactylis glomerata	2	3	0.5
Ranunculus repens	3	5	3
Athyrium fillix-femina	4	5	5
Bromus vulgaris	2	5	1
Galium aparine	2	5	0.5
Festuca occidentalis	1	1	0.5
Equisetum telmateia	2	3	0.5
Blechnum spicant	1	1	0.5
Epilobium ciliatum	3	3	2
Pteridium aquilinum	2	3	1

MOSS/LICHEN/SEEDLINGS (D)

Species	Density	Distribution	%
Kindbergia oregana	4	6	30
Alnus rubra	3	5	2
Cornus sericea	2	3	0.5
Polytrichum sp.	4	5	2

ADDITIONAL SPECIES (E)

Species	Density	Distribution	%	Layer
Hedera helix (ground)	2	6	10	herb
Hedera helix (vertical)	2	6	20	tree

B.3. Open Zone Assessment Raw Data

% COVER BY LAYER									
Tree (A)	**Shrub (B)**	**Herb (C)**	**Moss/Lichen (D)**	**Additional Species (E)**		**Surveyor(s)**		**Plot No.**	
24	81	20	60	35		CH, SP		Pavelic3_OpenZone	
					TREE LAYER (A)				
Species	**Density**	**Distribution**	A1	A2	A3	**A**	B1	B2	**B**
Alnus Rubra	1	2	0	0	2	2	1	0	1
Pseudotsuga menziesii	1	1	0	2	0	2	0	0	0
Crataegus monogyna	2	5	0	0	0	0	8	0	8
Acer macrophyllum	1	2	0	2	1	3	0	0	0
Thuja plicata	1	2	0	2	1	3	0	0	0
Prunus cerasifera	1	1	0	0	5	5	0	0	0
					SHRUB LAYER (B)				
Species					**Density**	**Distribution**	B1	B2	**B**
Cornus sericea					2	8	40	0	40
Rubus armeniacus					3	6	10	5	15
Symphoricarpos albus					1	4	0	2	2
Rubus ursinus					2	8	0	10	10
Daphne laureola					2	5	0	8	8
Vaccinium parvifolium					1	1	0	2	2
Rosa nutkana					2	3	1	2	3

Symphoricarpos mollis	1	1	0	1	1

HERB LAYER (C)

Species	Density	Distribution	%
Polystichum munitum	2	5	12
Equisteum telmatia	2	6	8

MOSS/LICHEN/SEEDLINGS (D)

Species	Density	Distribution	%
Lobaria pulmonaria[1]	2	6	15
Homalothecium fulgescens[1]	1	6	15
Orthotrichum lyellii[1]	1	1	10
Kindbergia oregana[1]	3	8	20

ADDITIONAL SPECIES (E)

Species	Density	Distribution	%	Layer
Hedera helix (ground)	3	8	20	herb
Hedera helix (vertical)	3	6	15	tree

[1]Cover was considered if the species was present on the ground and on tree stems below 1m

12. Appendix C – Mensuration Assessments Raw Data

C.1. Mature Zone Mensuration Raw Data

Tree #	Spp.	DBH (cm)	Total Height (m)	Crown Class	Tree Class	Conk	Scar	Fork or Crack	Rotten Branches	D. or B. Top	Crown Condition	Comments
1	Bg	32.4	29.2	S	8				4		Healthy	Ivy load, lost apical dominance
2	Fd	129.8	49.9	D	5	2			7	D	Healthy	Cooper's hawk nest
3	Fd	63.6	28.6	S	5			1	7	D	Healthy	Woodpecker impact
4	Fd	161.2	56.4	D	5	1	1		7	B	Healthy	Woodpecker impact, origin of scar unclear
5	Fd	127.5	52.0	D	5				5	B	Healthy	Woodpecker impact
6	Fd	146.7	51.6	D	5	1	1		5	B	Healthy	Fallen tree scar, woodpecker impact
7	Bg	47.3	29.8	S	5				4		Healthy	
8	Fd	120.7	43.7	D	5		1		7		Healthy	Woodpecker impact, potential fire scar
9	Fd	75.0	43.9	C	5				7	B	Healthy	Woodpecker and insect impact
10	Fd	122.0	53.6	D	5				7		Healthy	Woodpecker and insect impact, significant ivy load
11	Fd	150.8	53.1	D	5				7		Healthy	Woodpecker and

Tree #	Spp.	DBH (cm)	Total Height (m)	Crown Class	Tree Class	Conk	Scar	Fork or Crack	Rotten Branches	D. or B. Top	Crown Condition	Comments
												insect impact
12	Fd	116.4	47.9	D	5		1		7		Healthy	Woodpecker impact, ivy load, unknown scar origin

Notes: #4 retained lower branches longer (more sun exposure). The fork in 9 & 10 is above breast height, but the point of germination was level with the ground. Measured DBH of individual trees at 2m and together at 1.3m (181.9cm).

C.2. Transition Zone Mensuration Raw Data

Tree #	Spp.	DBH (cm)	Total Height (m)	Crown Class	Tree Class	Conk	Scar	Fork or Crack	Rotten Branches	D. or B. Top	Crown Condition	Comments
13	Bg	18.9	9.9	S	8				5	D	Healthy	Small ivy load
14	Fd	101.1	38.7	D	5				7	D	Healthy	Big burrel at ~1.5m, ivy load
15	Fd	50.5	NA	D	5				5		Healthy	Ivy load affected DBH, significant lean
16	Fd	65.7	41.8	D	5			3	5	B	Healthy	
17	Fd	72.7	30.5	D	5			3	5	B	Healthy	Ivy load
18	Fd	97.0	41.3	D	5				5		Healthy	Woodpecker impact
19	Fd	87.0	37.4	D	5				5		Healthy	

Notes: Significant lean of tree #15 impacted ability to calculate total height.

13. Appendix D – Soil Pit Descriptions Raw Data

D.1. Mature Zone Soil Pit Description Raw Data

Horizon	Depth (cm)	Colour	Texture	Coarse Fragments	Roots	Root Pores	Structure	Consist-ence	Comments
LF	-1-0	Douglas-fir cones and needles, twigs and branches, deciduous leaves (salal)							
Ah	0-11	10YR 4/3	SiCL	5% gravels, 5% cobbles	Plentiful fine, few medium	Few fine and medium	Fine subangular blocky	Dry, loose (1), non-plastic	Irregular horizon boundaries. Crushed moist texture.
Bm	11-23	10YR 4/4	SiCL	-	Few fine, medium, and coarse	Few fine and medium	Medium subangular blocky	Dry, soft (2), slightly plastic	Charcoal. Crushed moist texture.
Bmgj	23-45	10YR 5/3	SiC	-	Few fine and medium	Few fine, very few medium and coarse	Medium subangular blocky	Dry, soft (2), slightly plastic	Light mottling, 10YR ⅝. Crushed moist texture.
Cg	45+	10YR 6/1	SiC	-	Few medium	Few very fine	Medium subangular blocky	Dry, hard (4), slightly plastic	Frequent mottling, 10YR ⅝. Crushed moist texture.

General notes: Vegetation: Douglas-fir–salal type, orange honeysuckle, pink honeysuckle, baldhip rose, trailing blackberry, western starflower, daphne, moss, ivy, Oregon grape, snowberry, grand fir. Disturbed soil, second growth. Decent drainage, poor to moderate permeability.

D.2. Transition Zone Soil Pit Description Raw Data

Horizon	Depth (cm)	Colour	Texture	Coarse Fragments	Roots	Root Pores	Structure	Consist-ence	Comments
LF	-1.5-0	Medium and coarse branches, salal leaves, Douglas-fir cones							
Ah	0-14	10YR 4/3	SiC	5% gravels, 5% cobbles, 5% stones	Plentiful very fine, few fine, plentiful medium, few coarse	Plentiful fine, few medium	Medium subangular blocky	Dry, slightly hard (3), non-plastic	Irregular horizon boundaries. Crushed moist texture.
Bm1	14-21	10YR 4/3	SiCL	5% gravels	Plentiful fine, few medium, very few coarse	Plentiful fine, few medium	Medium subangular blocky	Dry, slightly hard (3), non-plastic	Crushed moist texture.
Bm2	21-38	10YR 4/4	SiCL	-	Few fine, medium, and coarse	Few fine and medium	Medium subangular blocky	Dry, slightly hard (3), non-plastic	Crushed moist texture.
Cgj	38+	10YR 5/3	SiCL	-	Very few very fine	Few very fine	Medium subangular blocky	Dry, hard (4), plastic	Crushed moist texture. Infrequent mottling, 10YR 5/6.

General notes: Vegetation: salal, common snowberry, baldhip rose, red alder, ivy, Himalayan blackberry, western swordfern, bracken fern, oceanspray, willow, Douglas-fir. The site has a gentle slope facing south.

D.3. Open Zone Soil Pit Description Raw Data

Horizon	Depth (cm)	Colour	Texture	Coarse Fragments	Roots	Root Pores	Structure	Consist-ence	Comments
LF	-2-0	Ivy leaves, small twigs and branches, deciduous leaves.							
Ah	0-27	7.5YR 2/0	SiL	5% gravels	Few very fine and medium	Very few very fine, few fine	Coarse subangular blocky	Moist, very friable (2), non-plastic	Crushed moist texture.
Bmgj	27-52	10YR 3/2	SiC	-	Few very fine, very few fine	Few very fine, very few fine	Coarse subangular blocky	Moist, firm (4), slightly plastic	Crushed moist texture. Light, infrequent mottling, 10YR 4/6.
Cg	52+	10YR 4/2	SiC	-	-	-	Coarse subangular blocky	Moist, friable (3), slightly plastic	Crushed moist texture. Frequent mottling, 10YR 4/6.

General notes: Vegetation: ivy (ground), western swordfern, daphne, red osier dogwood (above), lots of suspended dead wood that is covered in mosses and lichen. Poorly drained site, poor permeability. Mottling starts early.