VEGETATION CLASSIFICATION OF THE ENDOWMENT LANDS

by Grant A. Thompson

APRIL 1985

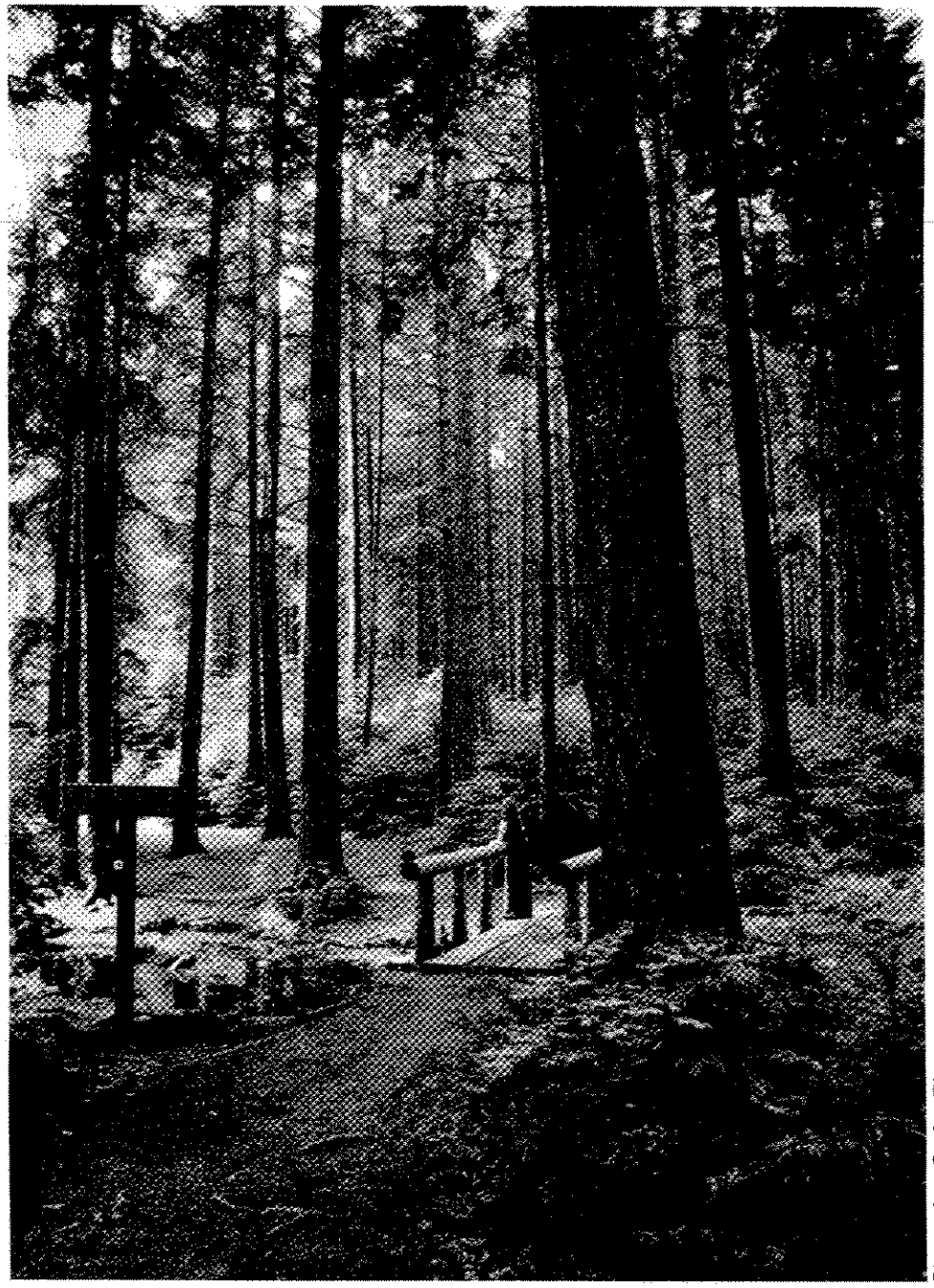

Photo by G. A. Thompson

Graeme's Crossing

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TABLE OF CONTENTS

LIST OF MAPS

LIST OF TABLES

Chapter I: INTRODUCTION

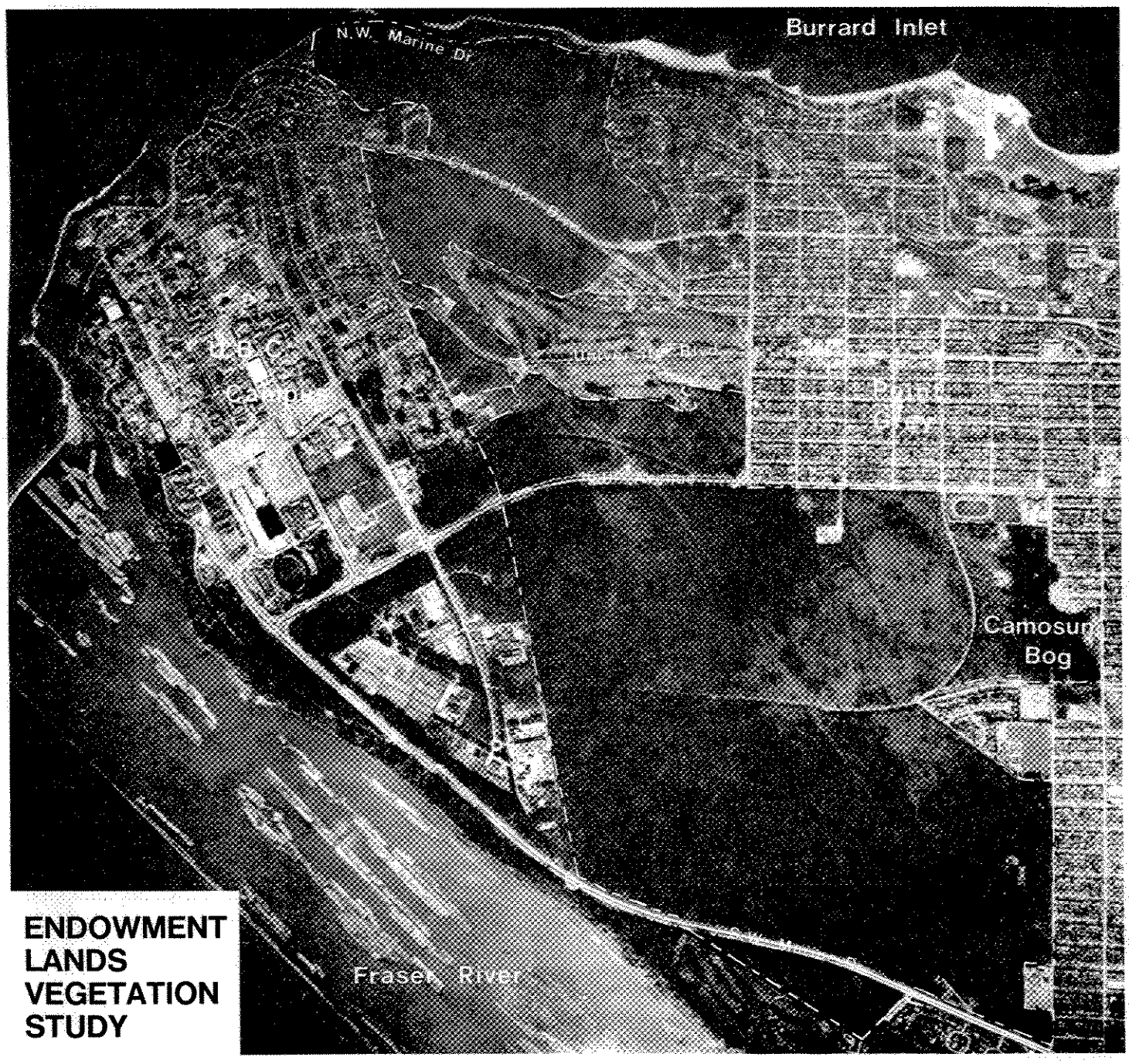
The primary objective of this report is to provide a detailed analysis of the vegetation of the Endowment Lands for park managers and educational purposes. This vegetation analysis provides park managers with a basis on which to make informed management decisions. This analysis provides a data base for educational users, primarily from the University of British Columbia and for the GVRD as well. With a solid data base future decisions can be based upon the results of previous management.

Vegetation and soil parameters were sampled at 125 releve plots. This information was grouped to produce 13 vegetation associations. In total 20 associations are identified and described in this association. Included are 7 vegetation associations of Camosun Bog as identified by M.A. Comeau in 1983. As well, 29 permanent vegetation plots have been established as a basis for future study.

This report opens with a brief discussion of the study area and its biophysical aspects. This is followed by a presentation of the methods used in vegetation classification. The body of the report contains detailed descriptions and photos for each of the 20 identified vegetation associations. The appendices include a summary table outlining plant species occurring within each association, locations of the permanent plots and floral lists. A large fold out map showing all the vegetation associations and their units is found in the pocket of the back cover. A separate data volume containing vegetation tables, locations, and soil data for each of the 125 releve plots is published for those wishing to apply portions of this study.

The grouping of units according to potential ecosystem associations was deemed unsuitable for this study. An ecosystem association contains those ecosystems capable of producing vegetation belonging to the same plant association at climax. This method of classification is not beneficial to those planning park programs where interest lies in the existing plant communities. Instead, the vegetation association grouping system has been used in this study. This method groups units of similar existing vegetation and soil indices together to produce associations which can be identified in the field.

LOCATION



ENDOWMENT LANDS VEGETATION STUDY

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Chapter II: STUDY AREA

Distribution and vigor of all plant species are a reflection of site. Site characteristics include: moisture regime, available nutrients, soil texture, site stability and local history. Understanding the local nature of these site characteristics on the Endowment Lands gives insight into how the present distribution of species has been determined.

Locally, the most important aspect has been history. The past disturbance of the forested area has been the single most important factor affecting vegetation patterns. Also important is soil moisture regime, a product of climate, soils, and topography which has affected plant vigor and influenced species composition.

Location

The Endowment Lands are sandwiched between the University of British Columbia and the City of Vancouver. This 770 hectare green belt, one of the largest timbered regions in the urbanized Lower Mainland, stretches across Burrard Peninsula from the Fraser River to Burrard Inlet.

Climate

The Endowment Lands fall into the wetter maritime coastal Douglas-fir Biogeoclimatic zone. The climate is one of mild, wet winters with warm, dry summers. Prevailing winds are from the west with gusts rarely exceeding 50 km/h, although a hurricane in 1962 caused considerable damage to the forest stands.

The following table lists climatic data from the University of British Columbia Meteorological Station:

Table 1: Selected Climatic Data

Mean annual temperature	9.8°C
Average summer temperature (June-August)	16.2°C
Average winter temperature (December-February)	4.0°C
Total annual precipitation	1257.7 mm
Annual growing period	265 days
Rain days	155 days
Sunshine hours - December	36 hours
Sunshine hours - July	282 hours

Physiography

Point Grey was formed 50,000 years ago as the Fraser River deposited clay and silt in a great delta. During the "Fraser glaciation", 20,000 years ago, a dense till of tightly packed boulders, sand, and silt was laid down over the original delta. As the ice retreated and the ocean returned, a thin layer of sand and gravel was deposited as a beach. This lag gravel is now 60 metres above sea level after the entire peninsula rebounded when the weight of the glacial ice was removed. This gravel provides the parent material from which the soils of the Endowment Lands have formed.

The Endowment Lands are on a peninsula of gently undulating uplands surrounded by the north arm of the Fraser River, the Strait of Georgia and Burrard Inlet. Steep cliffs, 45 to 90 metres in height, border the peninsula on three sides. The maximum elevation of 130 metres above sea level is achieved near the centre of the golf course.

The peninsula resembles a gently rounded plateau with an east-west axis, the land falling to the north and south. Slope is slight, averaging five to ten percent with many areas having no discernible gradient. To the north, drainage follows three deep ravines that have cut back 750 metres into the peninsula. South of the golf course drainage is along three creeks: Tin Can (Musqueam) Creek, Golf Course Creek, and Booming Grounds Creek.

Camosun Bog, the oldest bog in the Lower Mainland, lies on the central eastern boundary of the Endowment Lands. The bog was formed 12,000 years ago following the most recent glacial period.

Soils

The Endowment Lands is a small unit in which to analyse soil variability. Since the parent material is homogeneous throughout, soil variation has resulted from the presence of water over a long period of time.

In most cases, the coarse soil of the Endowment Lands should allow for adequate drainage. However due to the compact till, water movement is impeded and a high water table is created. Most of the soil does not exceed 1.5 metres in depth, with less than a metre the norm. Groundwater drainage is confined to the upper metre and where gentle depressions exist impeded drainage creates wetlands and bogs.

The Endowment Lands contain three soil orders: podzolic, gleysolic and organic. Podzolic soils are the most common, forming in cool, wet climates under coniferous and mixed forest stands. Podzols contain a leached layer where minerals and organic matter have been moved downward by moisture. This eluviated layer is usually less than two centimetres thick and is often discontinuous. Below this eluviated Ae horizon are one or more reddish Bf horizons where organic matter and sesquioxides accumulate.

The podzols appear in three soil series. The Summer series is uncommon and is found near the ravines, north of Chancellor Boulevard. Its diagnostic characteristic is an iron cementation in the Bf horizon which creates a perched water table. The Sunshine series contains little gravel and texture varies from sandy loam to sand. A thin Ae horizon is present. The Bose series also contains a thin Ae horizon, but is stonier than the Sunshine series. Texture is gravelly sand loam or sand loam and lower horizons may exhibit some mottling.

Gleysols form in flat and poorly drained areas. Under these conditions water collects on the heavy impermeable till, creating perched water tables throughout much of the year. The Heron series is the only gleysolic soil series occurring on the Endowment Lands. Its characteristics are a mottled grey mineral soil profile overlaid by black muck ten to fifteen centimetres thick.

Organic soils occur primarily in Camosun Bog. Here, over thousands of years, Sphagnum moss has decayed into an organic layer up to five metres deep. Water retention is extremely high.

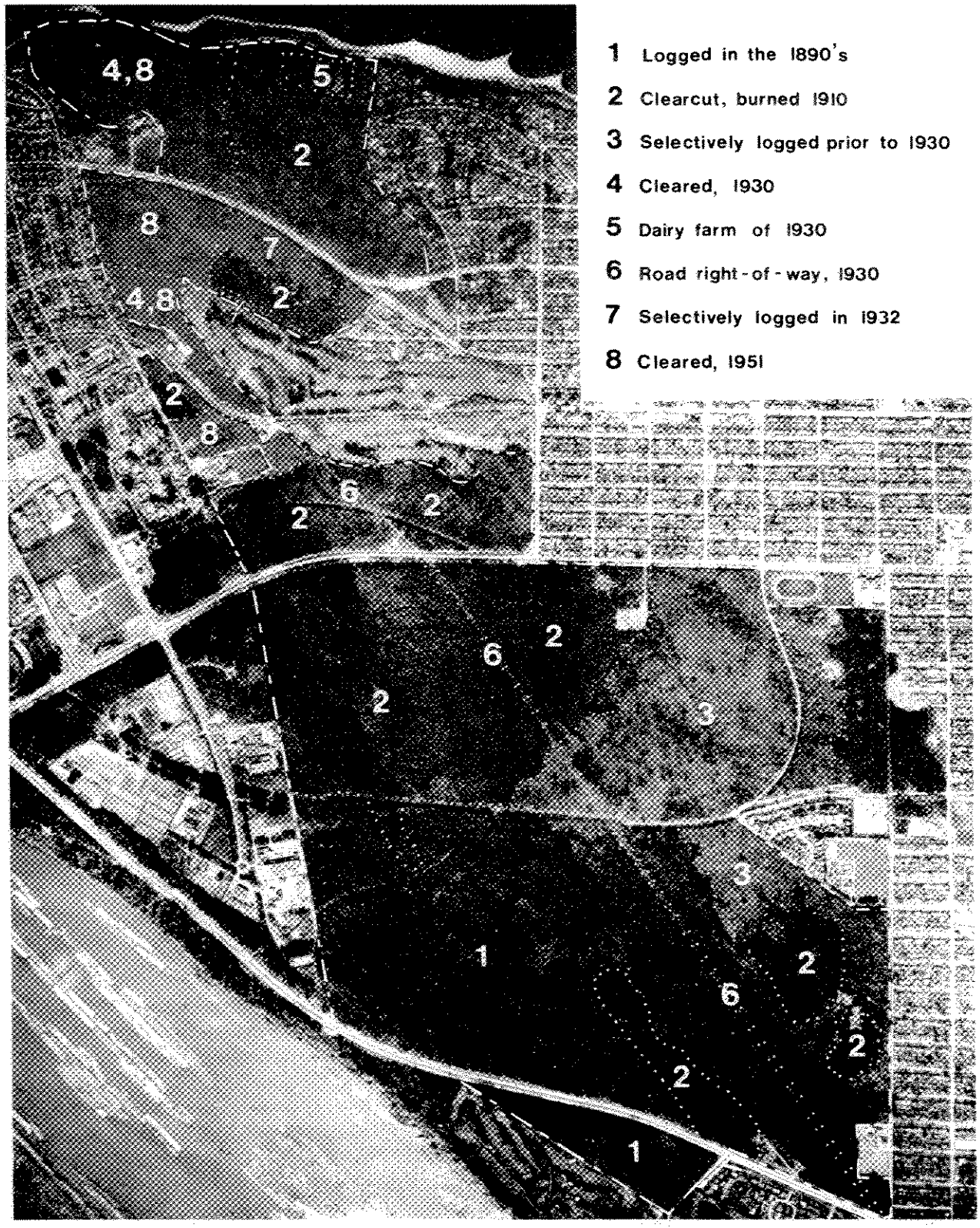
History

Even though the Endowment Lands are forested today, it has not always been so. That fact is supported by the evidence of stumps and logging debris over the entire area. All regions have been logged at least once since the 1860's, some clear-cut and others selectively logged. One region has been logged as recently as 1951 while other regions do not appear to have been disturbed since 1890. The timing and the manner in which disturbance occurred have resulted in the varied vegetation of the Endowment Lands today.

Prior to European settlement, the natives of Musqueam, on the Fraser River, exploited the timber resources of Burrard Peninsula. Western red cedar was utilized for construction of long houses and canoes, while the inner bark was processed into clothing and cook pots. Animals were hunted for their meat and skins and the local vegetation was utilized to supplement diets.

In 1865, when European development began, the first twenty-one year timber lease was granted for Point Grey to Colonel Edward Stamp. This was a lease to remove the highest quality Douglas-fir for use as masts and spars. By 1879, most of the north slope had been cleared of this top-grade fir. In 1880, Hastings Saw Mill commenced logging on the south slope, using ditches and flood gates to move logs into the Fraser River. By 1891, a five-year logging lease expired for the south slope and logging was terminated. During the early 1900's logging consisted of the removal of scattered patches of timber previously passed over as unsuitable for shipping. John Stewart, in 1909, cleared land for his dairy farm, the remnants of which became known as the Plains of Abraham. In 1912 the campus for the University of British Columbia was cleared.

HISTORICAL DISTURBANCES



1 Logged in the 1890's

2 Clearcut, burned 1910

3 Selectively logged prior to 1930

4 Cleared, 1930

5 Dairy farm of 1930

6 Road right-of-way, 1930

7 Selectively logged in 1932

8 Cleared, 1951

SCALE 0 400 800 1200 M
0 1600 3200 FT

On Sunday July 13, 1919 a serious brush fire was reported at 29th Avenue and Imperial Road. The fire slowly moved west through logging slash and timber. Its progress was halted by a backfire lit on Tuesday night along a line from the junction of Sasamat Street and 16th Avenue south-west to what is now Imperial Trail. On Wednesday a strong west wind fanned the flames and carried them across a marshy ravine (Camosun Bog) and as far as Highbury Street. Sacred Heart Convent as well as a number of homes were threatened but unharmed. The western boundary of the city limits was at that time Alma Street and this part of the city was relatively unsettled. Newspaper accounts of this fire are reproduced in Appendix 2.

In total 200 men from the provincial firefighting crews and the Point Grey Fire Brigade battled the blaze which eventually burned 500 acres, primarily provincial land. Without the diligent work of these fire fighters the entire Endowment Lands may have been in flames and the large conifers that we enjoy today would have been lost.

By 1930, the region between Chancellor Boulevard and Spanish Banks, west of Canyon trail, was cleared. Tree stumps were removed with explosives and the ground cleared to mineral soil. A work project was initiated in 1931 to clear and grade a road right-of-way to be known as Cleveland Drive from SW Marine Drive to University Boulevard. South of 16th Avenue, this old roadway now supports the Cascara-Mountain Ash-Deer Fern association. During the same period, the forest between Chancellor Boulevard and the golf course was selectively logged. This has lead to the development of an older deciduous association which contains coniferous trees that remained after logging.

In 1951, for a second time, a 120 hectare area was cleared between Chancellor Boulevard and Spanish Banks. The development also extended to University Boulevard west of the golf course. This region was again cleared of all stumps and the soil disturbed to a depth of half a metre in places. This is now occupied by the largest units of the Red Alder-Salmonberry and Bitter Cherry-Willow-Trailing Blackberry associations on the Endowment Lands.

Currently vegetation disturbance is restricted. Even so, all natural systems are in a constant state of change. This change, or plant succession, determines that the vegetation visible today may not be present in the future. Even if there is no more human disturbance on the Endowment Lands, plant succession will slowly develop some of the open meadows to deciduous forest stands and finally to coniferous forest stands.

Summary

Distribution of plant species is a function of soil, topography, climate and site history. Within the Endowment Lands, site history has been the most important factor in determining vegetation distribution.

Where logging has recently removed the overstory, red alder (Alnus rubra) has become the dominant tree species. Associated dominant plant species have been determined by the method of logging used. In large clear-cuts the tree canopy is virtually pure red alder with salmonberry (Rubus spectabilis) making up the shrub strata. Where logging was selective the red alder tree strata is occasionally broken by those coniferous trees that remained after logging. In these areas the shrub strata contains a high level of conifer regeneration.

Since this is an area of uniform precipitation, soil moisture regime can be viewed as the summation of soil orders and local topography. In some cases, the moisture regime governs what species will occur on a given site. As examples, skunk cabbage (Lysichitum americanum) and deer fern (Blechnum spicant) appear in greater abundance than available precipitation should permit, but impeded soil drainage provides the moist soils that they require. A more noticeable effect of soil moisture is in plant vigor and quality. On moist soils, salmonberry attains a greater height and density than it does on similar drier soils. Where soils are wet, tree species are affected. In these sites root growth is restricted and in extreme cases, this occurs in conjunction with dead or broken tops and deformed branching habit on relatively young trees.

Site history and soil moisture regime are the most important factors affecting plant distribution in the Endowment Lands. Past actions have influenced the establishment of specific plant species but soil moisture affects quality and vigor of individuals.

Chapter III: VEGETATION CLASSIFICATION

Methodology

Sampling was initiated with a series of preliminary plots designed to note perceived changes in vegetation. Preliminary sampling followed 87 surveyed transect lines and included a total of 744 radial plots. Except for a few circumstances, transect lines ran north-south at 400 foot (122 metres) intervals. Plot radius was roughly judged at this point, not measured. Floristic values for tree species, shrubs, and herbs were recorded but mosses were not studied at this point of the investigation. Texture and moisture within the upper thirty centimetres of the soil profile were sampled with soil augers.

The floristic information, recorded by the Domin-Krajina Cover-Abundance Scale (Wamsley et al., 1980) was then reordered by plot through C-Group cluster analysis. This produced 18 groupings (excluding Camosun Bog) based on an equal weighting of species. A visual check of the computer grouping suggested that several groups were being separated by relatively minor species differences and combination of two groups reduced this number to sixteen.

The next stage of sampling involved a more detailed study within releve plots. The releve system uses a relatively small sample stand to describe the entire plant community. A releve plot fulfills the following:

i) The plot should be large enough to contain all species belonging to the plant community.

ii) The habitat should be uniform within the sample stand area.

iii) The plant cover should be as homogeneous as possible.

A minimum of seven plots were randomly chosen from each grouping for releve sampling. Each of the releve plots was based on the pre-existing mini plot locations. A total of 125 plots, each 20 m x 20 m, were studied for: floristic composition, forest mensuration data, soil parameters, and site history.

Floristic information included species significance and vigor for tree, shrub, herb and moss strata (refer to Appendix 3). In deciduous forest stands, stems were tallied with a 4 basal area factor (baf) glass prism; in coniferous stands, with a 6 baf prism. Pathological remarks and diameters were recorded for each "in" tree and heights and ages were recorded for selected individuals. Soil profiles were studied by digging one metre pits. Information recorded included: humus form, profile texture, percent coarse material, colour, root distribution, and horizon distinctiveness. Site history was inferred by studying soils, timber age and the frequency of logging stumps with the assistance of aerial photos dating back to 1930.

From the detailed information collected during this stage of the investigation it became apparent that the preliminary groupings required further refinement. The minor differences in species composition that distinguished some groupings disappeared as additional releve plots were completed. The sixteen vegetation groupings were then refined to the final thirteen vegetation associations.

Twenty-nine permanent plots based upon the final associations have been surveyed and permanently marked in the field. The selection of each plot was determined by the following criteria. Plots were to:

(1) be representative of their vegetation association;
(2) cover variations within the association;
(3) be reasonably easy to locate from major trails or roads;
(4) be located so vandalism and abuse would be minimized.

During the period from July 1983 to May 1984 approximately 900 man days were spent in field work and data analysis.

Results

Through this project, thirteen vegetation associations have been identified in the forested portion of the Endowment Lands. Since Camosun Bog had been previously studied and its vegetation associations already determined (Comeau 1983), it was not included in the field aspect of this study. Description and mapping of associations within the bog were taken directly from Comeau (1983). However, her sampling methods were slightly different from the ones used in this report.*

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*Results from the bog vegetation study are presented in Vegetation Classification and Ordination of Camosun Bog by M.A. Comeau, 1983. In this study vegetation releves were taken along a systematic sampling grid already established for hydrological sampling. This method has inherent problems in that some vegetation plots are located on the border between two units making them difficult to assign to units. Unless plots are close together, some units can also be missed (such as the pond) or contain insufficient plots for characterization. Comeau took five additional plots to further clarify the distribution of vegetation.

Soil information available in Camosun Bog was also different from this study. Although peat stratigraphy profiles were taken for each plot, they were not as detailed as the soil profiles taken in the forest study. Therefore soil descriptions were omitted for the bog associations. Detailed soil water and chemistry data were used in the classification of the bog while data on these physical parameters were not available for this study.

Comeau identified 8 associations in total, 7 within the bog and one in the cedar forest to the west, outside the actual area of the bog. The cedar forest association was also identified in this study.

Twenty vegetation associations were identified in the entire Endowment Lands, including the seven bog associations. The associations are located on the maps on pages 12 and 13. A large map showing the units of each association is in the pocket of the back cover of this report. The associations are listed in Table 2 with total area for each association. Common names for plants have been used throughout this report. Appendix 7 provides a complete floral list of Latin and common names.

Following Table 2 is a description of each vegetation association and photograph. The descriptions include information on characteristic species, distribution, predominant soils and map units. The species listed for each stratum (or layer of vegetation) appear in descending order of occurrence. Only characteristic species are listed. To be considered characteristic for the association, the species has to occur frequently; that is it must occur in over 80% of the plots (presence class V). In a few cases species which occur in a smaller percentage of the plots (presence class IV) were included as characteristic because they were distinctive species for that association and were easily recognizable in the field.

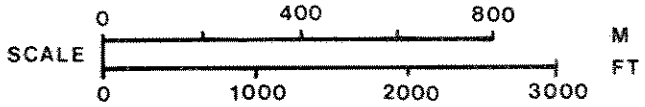
Mosses in the Endowment Lands fall into three substrate categories: epiphytic, epixylic and humic. Epiphytic mosses are those mosses found on living vegetation and epixylic mosses occur on decaying plant material such as logs and stumps. The humic mosses which appear in the species list for each association are found on the humus soil horizon. Although not considered diagnostic or characteristic, epiphytic and epixylic mosses are also listed in descending order of occurrence. Since both of these classes of mosses are found within microsites but are not necessarily representative of the association itself, they are excluded from the species list for the individual associations.

The herb species list is possibly incomplete because sampling occurred during the winter dormancy period. However, during a preliminary investigation of herbaceous vegetation in July 1985, no herbs were found to occur frequently enough to be considered characteristic of any association. Any new herbs that were found in abundance occurred along the edges of trails and roads and not in the association itself.

Data from floristic sampling are summarized in Appendix 3, Table iv by association and strata. This table, produced by U.B.C.'s VTAB program, illustrates presence class (Appendix 3, Table ii) and cover-abundance for each layer (Appendix 3, Table iii). Descriptions of vegetation strata are found in Appendix 3, Table i. Floristic listings for each of the 125 releve plots is found in the separate data volume.

Appendix 6 supplies methodology on the establishment of the 29 permanent plots and location of these plots in the field.

VEGETATION COMPOSITE MAP – NORTH



VEGETATION COMPOSITE MAP — SOUTH

SCALE 0 400 800 M
0 1000 2000 3000 FT

Table 2. Vegetation Associations of the Endowment Lands

Association	Title	Area (ha)	Percent	EISG No.
1	Hardhack - Salmonberry - Fireweed	30.9	4.3	N/A
2	Red Alder - Salmonberry	74.6	10.2	3.6
3	Bitter Cherry - Willow - Trailing Blackberry	20.9	2.9	3.4
4	Bigleaf Maple - Spiny Wood Fern	27.7	3.8	3.4
5	Cascara - Mountain Ash - Deer Fern	4.6	0.6	3.7
6	Vine Maple - Red Elderberry	97.5	13.4	3.6
7	Red Alder - Western Red Cedar - Red Huckleberry	109.7	15.0	3.4
8	Douglas-fir - Bracken - *Stokesiella oregana**	5.9	0.8	1.3
9	Douglas-fir - Salal - *Plagiothecium undulatum*	135.9	18.6	1.4
10	Western Hemlock - *Mnium glabrescens*	62.1	8.5	1.5
11	Western Red Cedar - English Holly	46.6	6.4	1.5
12	Western Hemlock - Douglas-fir - *Stokesiella praelonga*	23.4	3.2	2.6
13	Western Red Cedar - Western Hemlock - Sitka Spruce	68.4	9.4	2.5
14	Pacific Crabapple - Hardhack - False Lily-of-the-Valley - Skunk Cabbage	1.0	0.1	3.6
15	Shore Pine - White Birch - Western Hemlock - Salal	0.9	0.1	2.3
16	Western Hemlock - Salmonberry	6.4	0.9	2.5
17	Western Hemlock - Red Huckleberry - *Plagiothecium undulatum*	11.2	1.5	1.5
18	Western Hemlock - Salal - Labrador Tea	0.8	0.1	1.6
19	Pond Association	0.9	0.1	1.7
20	Salal - Labrador Tea - Bracken - False Lily-of-the-Valley	0.2	0.03	2.5
		729.6	100	

* Scientific names are used for mosses.

** Associations 14-20 are based upon:
Comeau, M.A. 1983. Vegetation Classification from Ordination of Camosun Bog. 74 p.

Chapter IV: VEGETATION ASSOCIATIONS

The following twenty vegetation associations have been recognized on the basis of existing floristic values and properties of the upper most soil layer. The associations themselves are ordered on the basis of their approximate seral stages.

Each description opens with a brief introduction of the association.

The species list is in descending order of strata. Nomenclature of vascular plants follows Taylor and MacBryde (1977), mosses follow Crum et al. (1973). This list contains all species which were found to be characteristic or diagnostic of each association. Where more than one species is deemed characteristic of a given stratum the species are listed in descending order of occurrence. Note also that all strata do not necessarily contain a characteristic species.

Where applicable, a list of epixylic and epiphytic mosses has been included. Since most moss species do not have common names their latin names have been used throughout this report.

Based on their characteristic species list each association has been described by referring to specific edatopic indicator species groups (EISGs). Explanation of this system is found in Appendix 4.

Where enough information is available mensuration data have been included for various tree species. Area has been determined using an electronic planimeter.

The section labelled distribution tries to explain the historical significance and location of the association.

Soils is a summary of the soil indices for each association. Descriptions for each of the four soil series are found in the introduction under "Soils". Explanations for both humus form and moisture regime are found in Appendix 3.

Variations are those units which are similar to but diverge moderately from the central concept of the association.

Where necessary, associations have been subdivided into map units. The fold out map in the back of this report locates all of the map units described in this chapter.

1 Hardhack - Salmonberry - Fireweed Association

This association represents the first stage of plant succession. These sites, many recently abandoned by man, now support a mixture of grass species and shrubs. These are the pioneer plant species that have the ability to invade and establish themselves on disturbed sites. Most pioneer species will not survive for more than a few years since they modify their physical environment until it becomes unfavourable to themselves. As this occurs, species able to use the new environment move in and occupy the site. Because of plant succession, the association is quickly shrinking in area as forest tree species are established along its fringes.

Characteristic Species

Shrubs:	Salmonberry Hardhack Red alder
Herbs:	Grasses Fireweed

Mosses

None

EISG No.

In this case this system is not applicable.

Mensuration Data

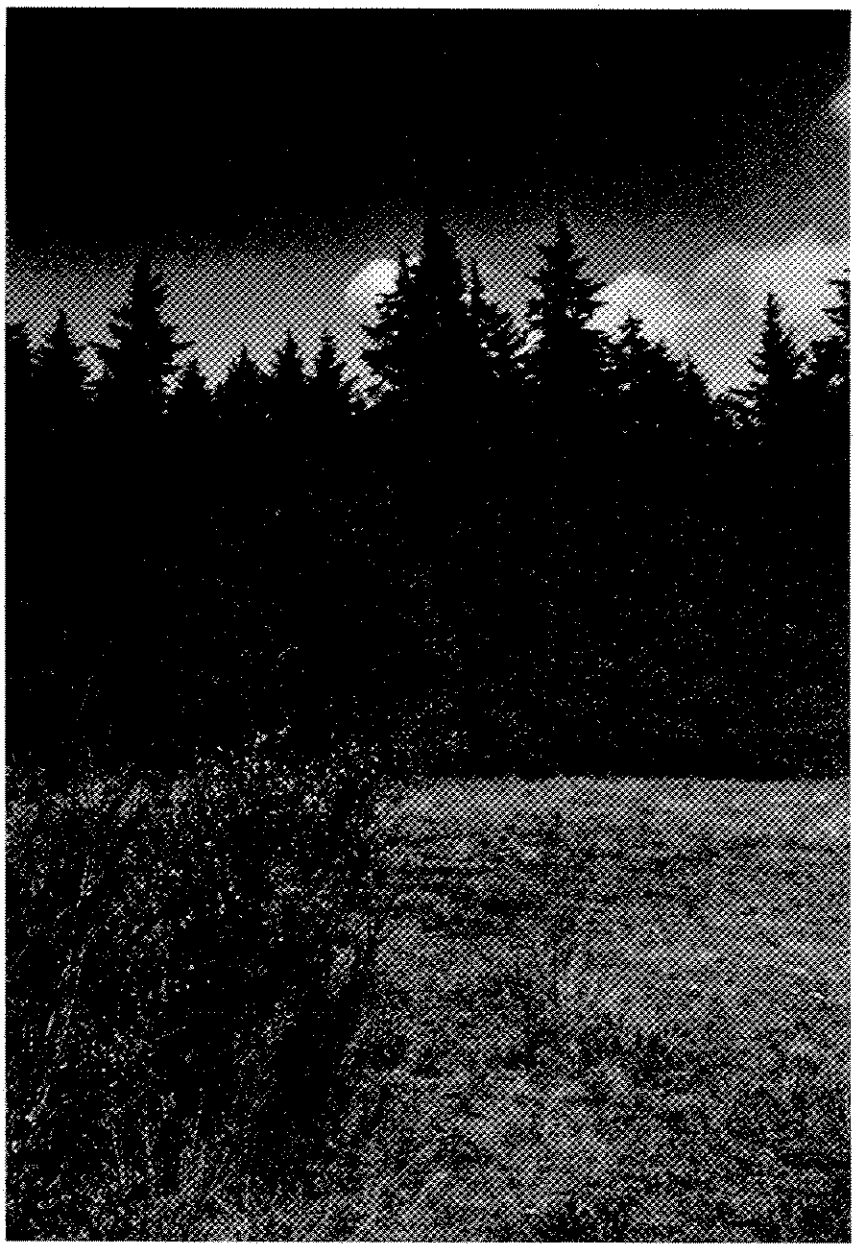
Not applicable.

Distribution

This association is not restricted to a single site or soil type but is found over the entire Endowment Lands. It can be found following major soil or vegetation disturbance, or when the establishment of tree species is purposely inhibited.

Soils

Since this association is found in greatly varying soil types it was not attempted to classify these soils or to dig soil pits.



Four major successional stages are represented above. Open meadow, shrubs (broom), young deciduous forest (red alder), and mature conifer forest (western hemlock).

Variations

Within this association three distinct variations exist. The first variation includes the abandoned clearing of the Plains of Abraham, Clinton's Stables, the Garden of Eden, and the area along SW Marine Drive. All of these sites demonstrate the process of plant succession. The Plains of Abraham is now only 0.40 hectares but in 1930, as John Stewart's Dairy Farm, it was 3.20 hectares. Since that time red alder and bitter cherry (Prunus emarginata) have seeded in from the west and south. These clearings are returning to the forest more slowly than they would in a more remote situation as heavy user impact has checked the establishment of some individuals.

The second variation has been created by high water tables. South of University Boulevard is a small depression which holds a considerable amount of water year round. The major vegetation is hardhack (Spiraea douglasii) at two metres in height with Scouler's willow (Salix scouleriana) around the bowl's fringes. A similar area occurs as Tin Can (Musqueam) Creek flows southward and forms a large pond north of Imperial Trail. This appears to be a recent phenomena as red alder snags exist in the centre with hardhack and willow also present.

The third variation occurs along powerline corridors. To limit interference with powerlines, underbrush is removed periodically so that tree species have been unable to establish themselves. These corridors of extremely dense salmonberry will not experience any significant change in plant species because of this periodic brush removal.

Map Units

1a) The Plains of Abraham are formerly John Stewart's dairy farm.

b) The "Garden of Eden" was at one time a works yard for the City of Vancouver. A wide variety of tree species including honeylocust (Gleditsia triacanthos), horse-chestnut (Aesculus hippocastanum), english oak (Quercus robur), Norway maple (Acer platanoides), and Manitoba maple (A. negundo) are thriving in this clearing. Seed for these trees may have originated from refuse from city property.

c) This clearing is all that remains of Clinton Stables.

d) This unit, formerly a road construction yard now supports broom (Cytisus scoparius). Along the perimeter young red alder is invading, while the remainder of the unit supports a variety of grass (Poaceae spp.).

e) During construction of Sedgewick Library at UBC, fill was dumped along the perimeter of Camosun Bog. This unit now sustains a variety of pioneer species.

f) This is a heavily abused and compacted area which now supports only moss and grass species.

g) This bowl has been flooded due to restricted drainage apparently caused by the construction of University Boulevard.

h) These are trails and hydro right-of-ways composed primarily of salmonberry but with occasional patches of hardhack.

i) Flooding of Tin Can (Musqueam) Creek.

j) A manicured neighbourhood park.

k) Pioneer Trail, originally built as an access to the dairy farm, contains primarily salmonberry. There are also segments of red alder and bigleaf maple (Acer macrophyllum).

2 Red Alder - Salmonberry Association

This is one of the most distinctive vegetation associations found on the Endowment Lands and is dominated by red alder and salmonberry.

The association is characterized by a tree canopy of even-aged red alder. Black cottonwood (Populus trichocarpa), a less shade tolerant species, is found as scattered invididuals or in small clumps of two or three trees and although the same age, is up to four metres taller. Because of this association's history no coppice growth of either tree species is found.

Red elderberry (Sambucus racemosa) is found only in the tall shrub layer at moderate density levels while salmonberry cover is usually light but may have a dense cover wherever soil moisture content increase.

In the low shrub stratum salmonberry is consistently so dense as to make penetration extremely difficult.

Characteristic Species

Trees:	Red alder Black cottonwood
Shrubs:	Salmonberry Red elderberry
Ferns:	Spiny wood fern Sword fern

Mosses

No moss is found on humus. Epiphytic mosses are Dicranum spp., and Stokesiella praelonga. Epixylic mosses are made up of Dicranum spp., Mnium glabrescens, and Stokesiella praelonga.

EISG No. 3.6

Mensuration Data

	Red Alder	Black Cottonwood
Age:	28-32 yrs	31-33 yrs
Height:	23-30 m	25-36 m
Diameter:	18-35 cm	25-55 cm

The shrub strata are extremely dense composed primarily of salmonberry and red elderberry. Note the large black cottonwood in the right foreground. No conifer regeneration exists in this association.

Distribution

The distribution of this association is dependent upon past disturbance. In 1931 the northwest block between Chancellor Boulevard and NW Marine Drive was cleared for development. Stumps were removed using explosives leaving craters which are still evident today. Red alder quickly became the major species in the tree canopy. In 1951 the area was cleared again. This time development included the original block plus the portion west of the golf course. Red alder which seeded in from the fringes of the development shortly after clearing was halted, has produced the homogeneous, even-aged association seen today. In those areas that red alder was not successful in seeding immediately, bitter cherry and willow have become established.

Soils

Soil Series:	Bose/Sunshine
Humus Form:	Mull/moder
Moisture Regime:	Mesic

A ploughed horizon (Ap), created by the heavy machinery used to clear the developments in 1951, averages 35 centimetres deep. The foliage of red alder usually decomposes quickly to produce a mull humus form. The occurrence of a moder humus form is due to the high production of foliage by the shrub layer, specifically the dense salmonberry cover.

There is a high degree of soil moisture variability within this association. In low lying areas the fall water table is within 25 to 40 centimetres of the surface. Soil mottling occurs in areas experiencing standing water. Elevated regions rarely have the water table within the first metre.

Even though the ground slope along Admiralty Trail reaches 15% there are many pockets of standing water where stumps were extracted. These pockets intercept runoff and have created a complex situation of moisture variability.

Variations

The one variation of this association occurs where elevation is reduced. Although the soil type is unchanged, the higher water table affects vegetation growth. Red alder is only 18-22 metres tall and salmonberry replaces red elderberry in the tall shrub stratum. The taller salmonberry occurs in wetter soils where the water table is either perched or within 50 centimetres of the surface.

Map Units

2a) Young red alder less than six metres tall are along the roadside. Twenty metres north of University Boulevard are the largest vine maple on the entire Endowment Lands. The maple still assumes its shrub form, with many stems, but is twenty metres tall and twenty centimetres in diameter.

b) These two units contain moist to dry soils and scattered black cottonwood.

c) Here is a mid-slope position where red alder does not reach its full height potential.

d) Soils here are well drained allowing the establishment of small pockets of bitter cherry.

e) This lower unit has poorly drained soils supporting the wetter variation. Red elderberry is not found in the tall shrub stratum and the growth of red alder has been inhibited.

f) Black cottonwood is common in small clumps or as large individuals.

g) This unit was cleared in 1931 but escaped the development of 1951. Bigleaf maple occurs as scattered individuals and some logging stumps can still be found.

h) Drainage here has been altered creating pockets of standing water. This older unit, 50-55 years, is suffering from poor growth and vigor.

i) Both units are small patches along Imperial Trail that originated from the selective logging prior to 1930.

3 Bitter Cherry - Willow - Trailing Blackberry Association

The majority of this association is found on the highest and driest sites within the Red Alder - Salmonberry association.

The tree layer is a mix of bitter cherry, willow and red alder, with minor components of bigleaf maple and white birch (Betula papyrifera). Because of bitter cherry's intolerance to shade and its high initial stocking levels, most of the unit is experiencing high mortality. Up to 54% of the standing trees are dead.

All shrub cover is within the low stratum with very low cover-classes, much less than the neighbouring Red Alder - Salmonberry association.

Trailing blackberry (Rubus ursinus) is extremely thick within the herb stratum.

Characteristic Species

Trees:	Bitter cherry Red alder Willow
Shrubs:	Red huckleberry Salal Salmonberry
Ferns:	Sword fern Bracken
Herbs:	Trailing blackberry

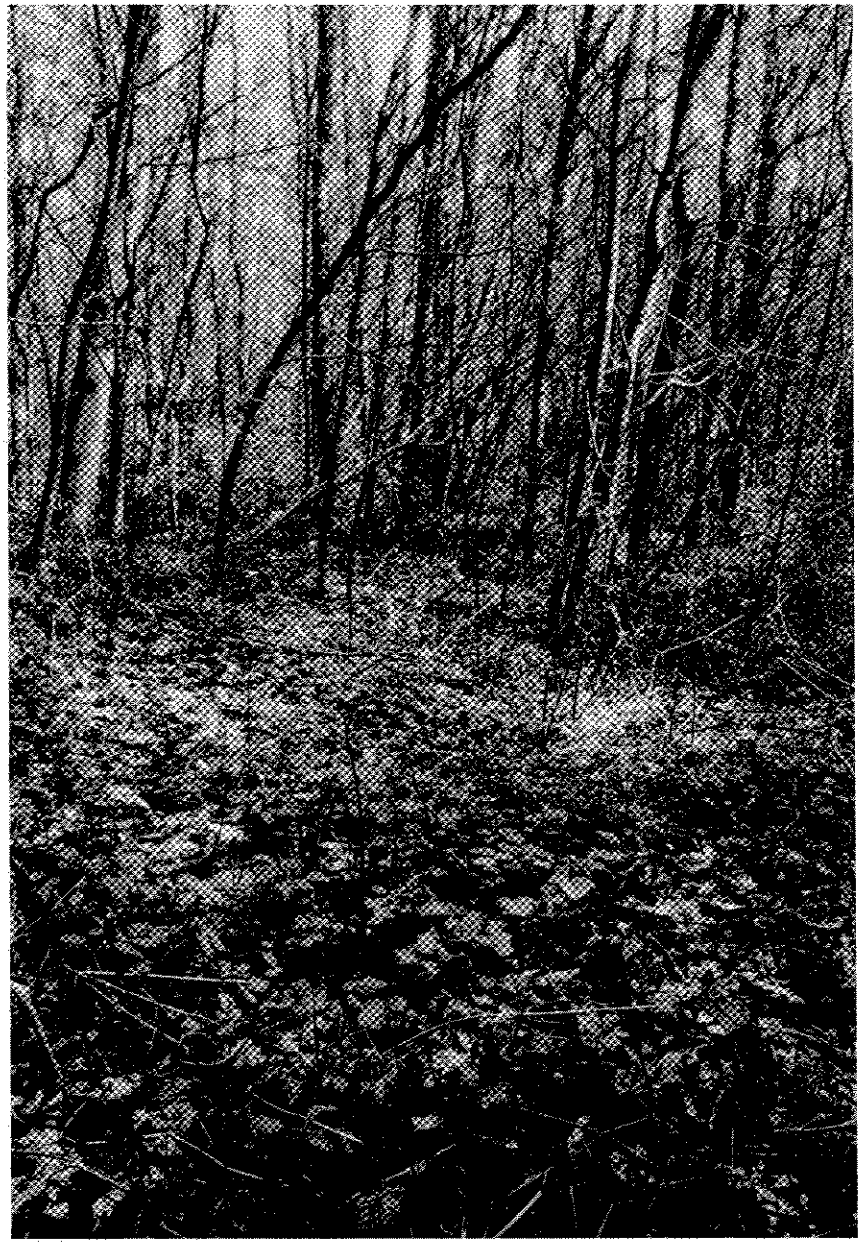
Mosses

No mosses are found within this association.

EISG No. 3.4

Mensuration Data

	Bitter Cherry	Willow	Red Alder
Age:	29-35 yrs	24-35 yrs	25-29 yrs
Height:	15-23 m	16-19 m	16-21 m
Diameter:	14-20 cm	11-19 cm	20-25 cm



The shrub strata of this association are less dense than the neighbouring Red Alder - Salmonberry association. Note the trailing blackberry and the unfolded bracken fronds. Bitter cherry, red alder and willow are clearly visible in this photograph.

Distribution

The majority of this association occurs north of Chancellor Boulevard between Canyon Trail and the western boundary. When red alder seeded the cleared area north of Chancellor Boulevard in 1951 it did not sufficiently restock the high, dry sites. In these openings the Bitter Cherry - Willow - Trailing Blackberry association was established two to five years later. The moderate slopes of 5-18% are enough to make this the driest site on the Endowment Lands, a situation preferred by bitter cherry. There are some small pockets where bitter cherry occurs in pure stands but in most cases it appears with a mixture of other deciduous species.

The older variation is found north of Tin Can (Musqueam) Creek within a logged area where burnt stumps and logging debris are still evident.

Soils

Soil Series:	Sunshine
Humus Form:	Moder
Moisture Regime:	Mesic

The northern area displays a disturbed upper horizon (Ap). Along Tin Can Creek the association is found on a Bose soil series but also presents a Moder humus form. Here the upper horizon contains a high level of charcoal and ash reflecting its recent logging history. Cobble and coarse fragment content is 50-75% by volume, high for the Endowment Lands.

These soils, due to their coarse texture and elevation, are among the driest on the Endowment Lands. Water tables, when encountered, are at least 60 centimetres below the surface even during the wettest periods.

Variations

One variation occurs north of Tin Can (Musqueam) Creek. This is an older stand of bitter cherry which contains a high percentage cover of red alder. Ages are 35-45 years with heights of 20-25 metres. There is some Douglas-fir (*Pseudotsuga menziesii*), 50 years of age. The shrub layer is primarily red huckleberry (*Vaccinium parvifolium*) and western red cedar (*Thuja plicata*).

Map Units

3a) The tree strata in this unit consists of pure bitter cherry.

b) Here the tree strata is composed of a mixture of deciduous species.

c) This young unit was established twenty-five years ago after the conifer stand around the school's playfield was removed.

d) These units make up the older variation which was burned in the fire of 1919.

4 Bigleaf Maple – Spiny Wood Fern Association

The predominant tree species in this association are red alder and bigleaf maple. Bitter cherry occurs on level areas where older Douglas-fir and western hemlock (Tsuga heterophylla) appear as scattered individuals.

Shrub species are found only in the tall stratum. Salmonberry and red elderberry combine to create a low to moderately dense shrub layer. Red huckleberry is found only on old stumps and decaying logs.

Licorice fern (Polypody glycyrnhiza) occurs only on selected individuals of bigleaf maple.

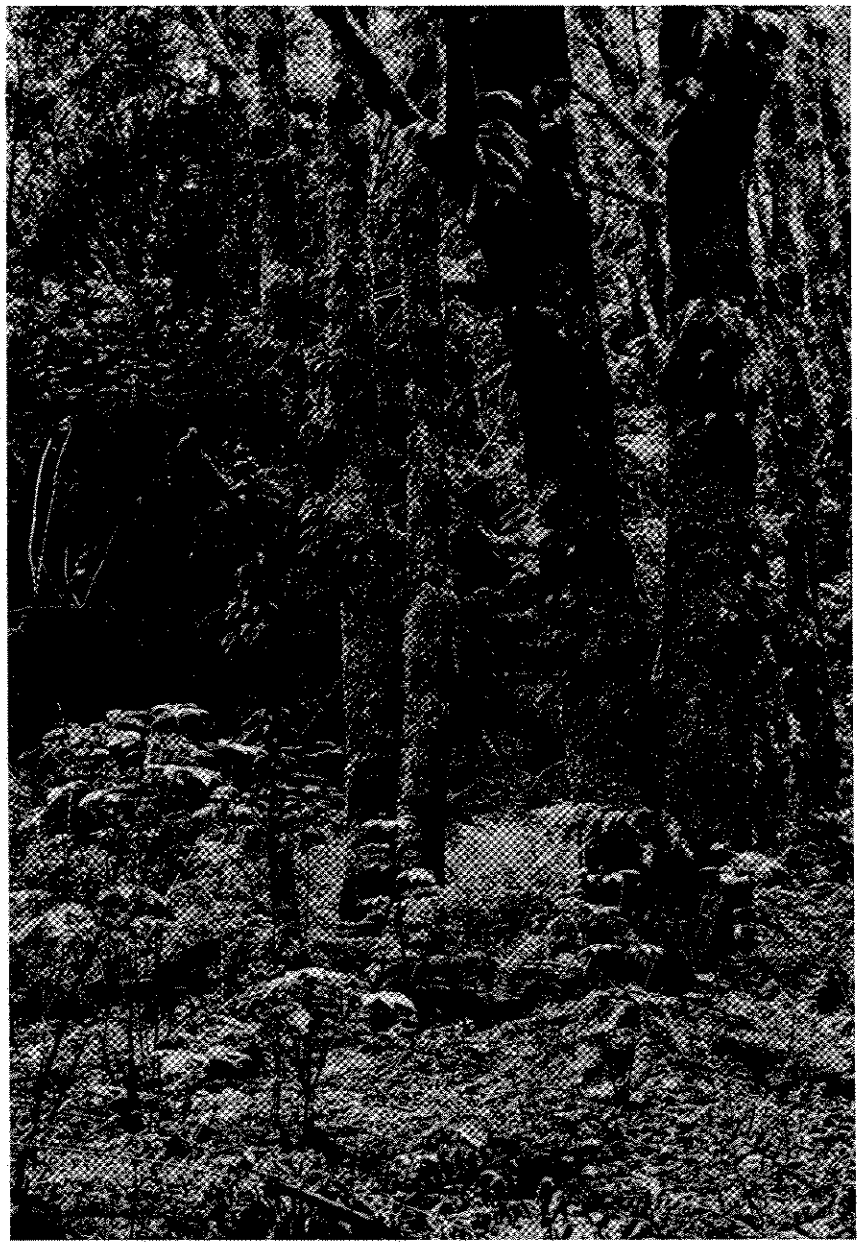
Characteristic Species

Trees:	Red alder Bigleaf maple
Shrubs:	Salmonberry Red elderberry
Ferns:	Spiny wood fern Sword fern Bracken
Herbs:	Trailing blackberry

Mosses

No mosses appear on humus. Epiphytic moss includes Dicranum spp., and Stokesiella praelonga. Epixylic mosses are Dicranum spp., Stokesiella oregana, Hypnym circinale, and Mnium glabrescens.

EISG No. 3.4



Note the licorice fern and epiphytic mosses on the bark of the bigleaf maple. Shrub strata densities are low.

Mensuration Data

	Red Alder	Bigleaf Maple
Age:	50-55 yrs	50-55 yrs
Height:	21-26 m	25-27 m
Diameter:	31-34 cm	40-50 cm

Distribution

The existence of the variation along NW Marine Drive is based on the ability of red alder and bigleaf maple to support themselves on this steep slope. With their broad root systems both species are able to stabilize the 70% slope found along these cliffs. As trees slump down the slope both species are able to take advantage of the new opening and move in quickly. The southern variation, below Imperial Trail, established following logging demonstrated by the burnt tree stumps visible today. The area was not totally clearcut. Large conifers that exist today were at that time young regeneration which took advantage of the removal of the overstory to put on rapid height and diameter growth.

Soils

Soil Series:	Bose
Humus Form:	Mull
Moisture Regime:	Mesic

Variations

Along NW Marine Drive is a steep sandy slope prone to soil slumping. The tree stratum is 30 years old and 20-25 metres tall. Along the bottom of the cliff black cottonwood is prominent.

Map Units

4a) This 70% slope along Spanish Banks is prone to occasional soil slumping.

b) This unit supports the majority of this association. The area directly south of Imperial Trail was established after the fire of 1919.

c) This unit is lower and wetter than the adjoining Douglas-fir - Salal - Plagiothecium undulatum association. It is this difference in soil moisture that inhibited the regeneration of Douglas-fir in this region and allowed red alder to take hold.

5 Cascara – Mountain Ash – Deer Fern Association

This association is found on a very wet site where red alder, bitter cherry and cascara (Rhamnus purshiana) suffer from broken tops and deformed branching habit.

The shrub strata is dense. Salal (Gaultheria shallon) appears only in the low stratum on nurse logs. Much of the cascara in the shrub strata are individuals that originated in the tree stratum. These have been windthrown but because this species is extremely hardy, they are all producing new foliage.

Skunk cabbage is found in muck pockets over the entire association.

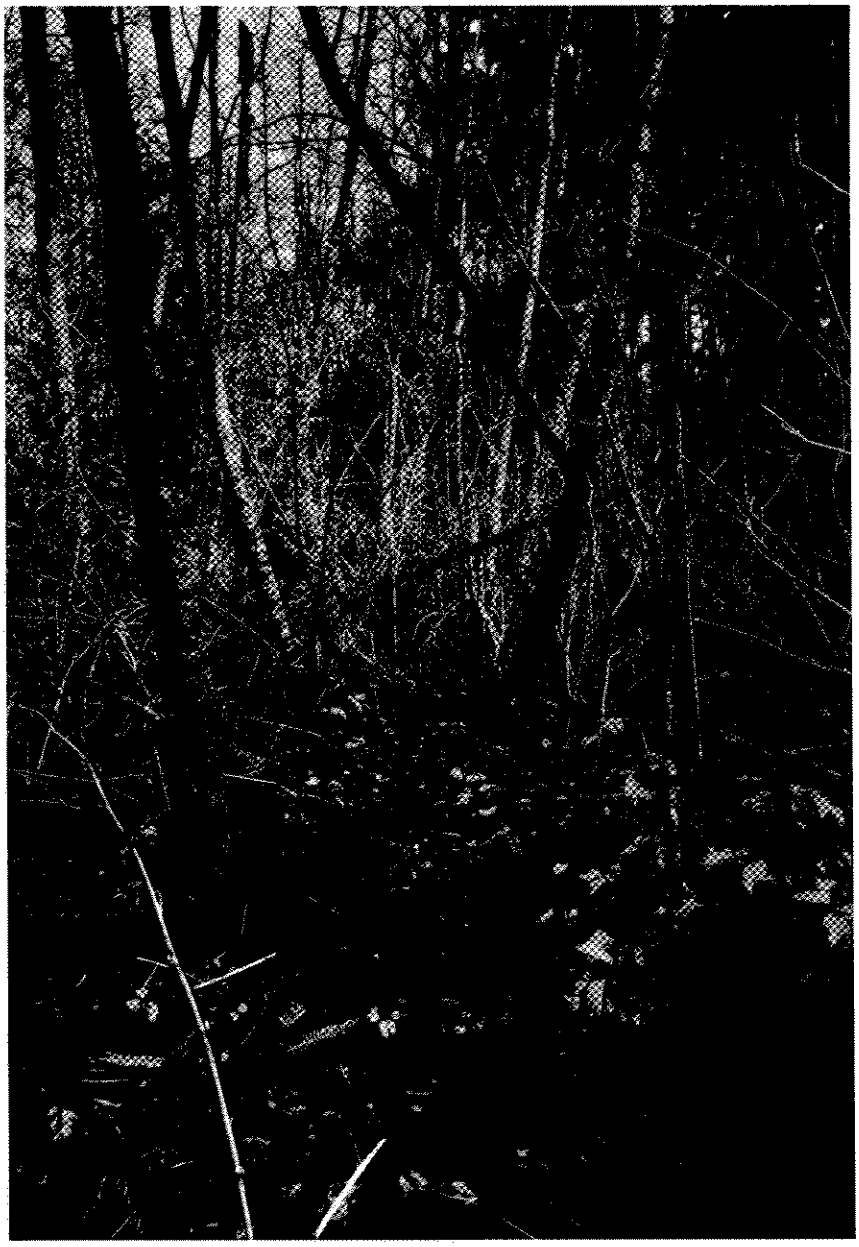
Characteristic Species

Trees:	Mountain ash Red alder Cascara
Shrubs:	Salal Cascara Mountain ash Salmonberry Western hemlock Western red cedar
Herbs:	Trailing blackberry Skunk cabbage
Ferns:	Spiny wood fern Deer fern

Mosses

A high water table inhibits the establishment of moss on humus. Epixylic Moss: Plagiothecium undulatum, Rhytidiadelphus loreus, Mnium glabrescens, Stokesiella oregana.

EISG No. 3.7



In this association cascara is able to grow well whether vertically or horizontally. Salmonberry is very common in the shrub strata. Note the deer fern in the lower left foreground.

Mensuration Data

	Red Alder	Bitter Cherry	Cascara
Age:	40-50 yrs	45-50 yrs	50-52 yrs
Height:	13-17 m	18 m	13-15 m
Diameter:	15-20 cm	13-22 cm	9-15 cm

Distribution

This association is easily recognized by its long narrow corridor extending from SW Marine Drive to Imperial Trail. It has developed in a road right-of-way cleared as a work project in 1930. At that time, trees and stumps were removed in preparation for future road work which was never completed.

The Cascara - Mountain Ash - Deer Fern association contains the tallest cascara found on the Endowment Lands as well as the highest concentration of deer fern. The standing water in this association has led to the development of a poor quality tree strata with broken tops, unusual branching habit, and poor height and diameter growth.

Soils

Moisture Regime: Subhydric

Soil type is difficult to verify because of the perched water table, but it is expected that the soil profile contains a deeply ploughed horizon.

Soil compaction accompanying the road work has impeded water absorption creating the large areas of standing water present during most of the year. Over much of this association the local drainage pattern has adopted the old road cut as its major route.

Variations

In the only variation of this association red alder is replaced by mountain ash and white birch. Western red cedar, and western hemlock appear in the tree stratum with low cover-classes.

Map Units

5a) This major unit is divided into two sectors along the old road right-of-way.

b) The absence of red alder is the notable characteristic of this unit.

6 Vine Maple - Red Elderberry Association

This association is made up of deciduous tree strata with scattered conifers and a dense understory. The frequent wet pockets support skunk cabbage.

The tree strata are dominated by red alder with scattered older western hemlock and western red cedar which were part of the lower tree canopy when this area was logged.

The shrub strata contain a dense layer of vine maple (Acer circinatum) forming as a series of small stems from a central patch, which either grow vertically or turn horizontal after a few feet to become a tangled barrier.

Both red huckleberry and salal are found on old logging stumps and nurse logs. Western hemlock seedlings are found on nurse logs as well.

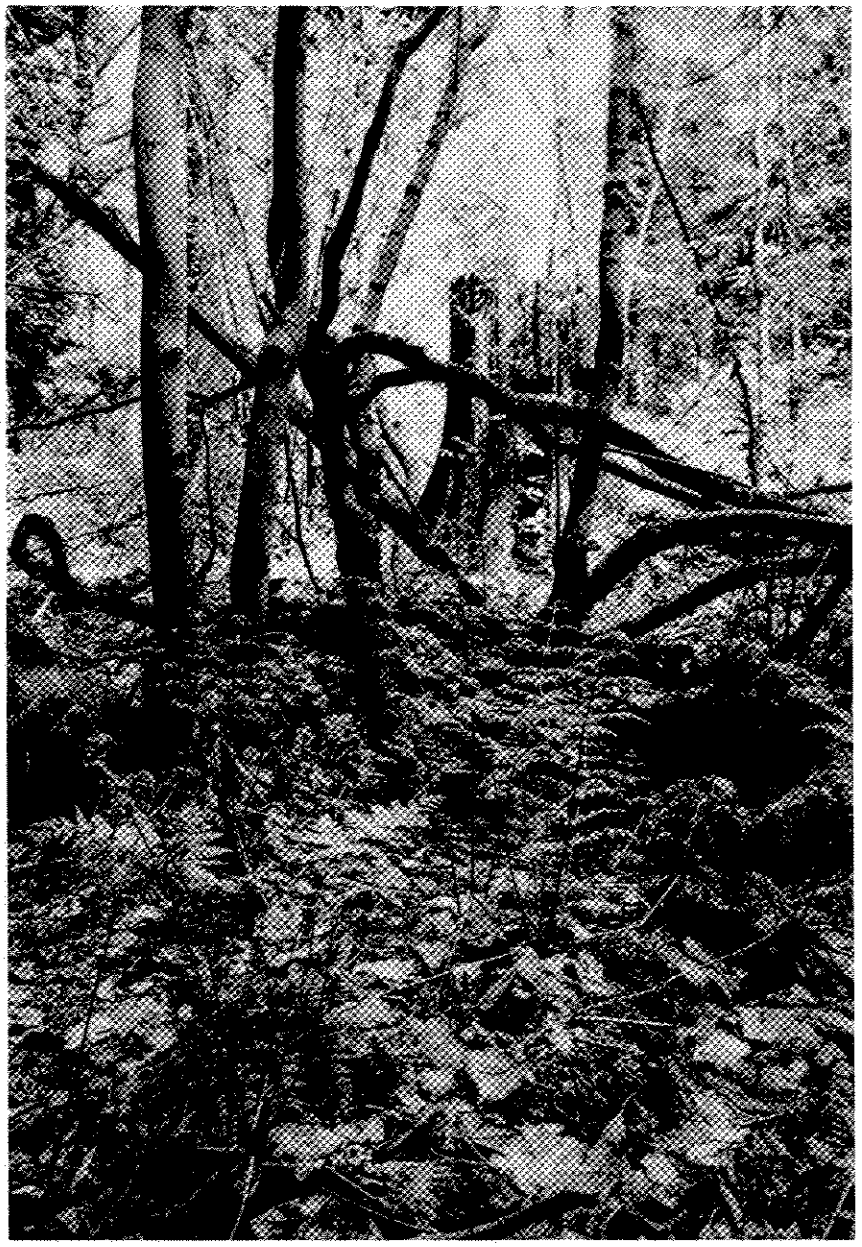
Characteristic Species

Trees:	Red alder
Shrubs:	Vine maple Salmonberry Red elderberry Red huckleberry
Ferns:	Spiny wood fern Sword fern
Herbs:	Trailing blackberry Skunk cabbage
Moss:	Plagiothecium undulatum

Mosses

Plagiothecium undulatum is the only moss found on humus and is scattered throughout the association. Epiphytic mosses: Hypnum circinale and Dicranum spp., Rhytidiadephus loreus, and Stokesiella oregana.

EISG No. 3.6



Abundant vine maple, such as in the centre of this photograph, produces a very dense shrub strata. Spiny wood fern creates an almost continuous carpet. Note the logging stump with its springboard notches in the centre of the photograph.

Mensuration Data

	Red Alder	Western Hemlock
Age:	45-55 yrs	70-80 yrs
Height:	28-30 m	30-35 m
Diameter:	30-40 cm	50-70 cm

Distribution

North of Chancellor Boulevard this association is found along the deep cut ravines and covers the plateau between Pioneer and Spanish Trails. The rest of the association has developed in areas logged prior to 1931. The logging is still evident today from very large stumps and debris. Small stands of Douglas-fir, now part of the Douglas-fir association, were left untouched during logging. Those stands would have been only 20-30 years of age, unsuitable for logging.

Soils

Soil Series:	Sunshine
Humus Form:	Moder
Moisture Regime:	Hygric

Patches of the Heron soil series occur in areas experiencing standing water.

In the flat hummocky units a perched water table is common throughout the year while the ravines experience flash runoff during rainy periods.

Variations

Within the northern ravines skunk cabbage is absent and vine maple is less prevalent in the shrub strata. Side slopes are 40-60%.

Map Units

6a) Depressions holding standing water and muck support skunk cabbage.

b) Flat with few depressions. Little or no skunk cabbage.

c&d) Both gulleys have unstable side slopes with grades of 40-60%.

e) A moderately well drained unit with scattered bitter cherry and vine maple.

f) This unit was burned in the fire of 1919.

g) This unit is subject to extreme flooding where large bodies of water are formed. Skunk cabbage is common.

h) This unit was created after the selective logging in 1932. During this time the neighbouring Little Australia housing development was cleared. The perimeter bordering this development contains many exotic garden species resulting from the dumping of garden refuse. Young cedar and hemlock are common.

Mosses

No moss on humus is found in this association. Epixylic Mosses: Plagiothecium undulatum, Rhytidiadelphus loreus, Stokesiella oregana, Hypnum cincinale, Stokesiella praelonga, Mnium glabrescens, Dicranum spp.

EISG No. 3.4

Mensuration Data

	Red Alder	Western Red Cedar
Age:	40-50 yrs	55-65 yrs
Height:	18-25 m	16-25 m
Diameter:	20-40 cm	35-45 cm

Distribution

In July of 1919 a brush fire started at the junction of Imperial Road and 29th Avenue. The fire moved slowly westward and was halted by a fire break extending from the junction of Sasamat Street and 16th Avenue south-west to what is now Imperial Trail. This fire break is now the western boundary of this association.

The fire killed the juvenile Douglas-fir which had been established following logging and without an adequate seed source Douglas-fir was not re-established. Some western red cedar, which is now 65 years of age, germinated shortly after the fire. This cedar supplied the seed for the production of cedar regeneration visible today. During the ten to fifteen years following the fire the red alder now present became established.

Alder grows rapidly and soon overtopped the older cedar seedlings. The red alder has now reached its maximum height and the cedar, which is shade tolerant, will soon to break through the tree canopy. At that time in the direct sunlight the cedar should show marked improvements in growth. Competition with this regeneration has resulted in lower covers of salmonberry and red elderberry than are found in the Red Alder - Salmonberry association.

Soils

Soil Series:	Sunshine
Humus Form:	Moder
Moisture Regime:	Mesic

Soil profiles show some disturbance in the upper horizons.

The water table can be found within 30-70 centimetres of the surface but is rarely perched.

Variations

No major variations were found within this association.

Map Units

7a) Conifers in the tree stratum and shrub stratum are not as abundant as in the rest of the association.

b) The tall shrub stratum is poorly developed.

c) Scattered Douglas-fir can be found in the A3 and B1 strata. Other coniferous regeneration is infrequent. The southern sub-unit, adjacent to the pond, has little mature conifer of any species.

d) This unit is within the road right-of-way cleared in 1931. It is a dry site with good drainage in comparison to the poor drainage found below Imperial Trail. Most of the red alder is now dying back and being replaced by western hemlock.

e) This low lying unit has a high water table which has inhibited establishment of Douglas-fir. In some portions alder is absent and the unit contains almost pure red cedar with scattered muck pockets.

f&g) These are also low lying units but contain more conifers than 7e.

h) These small pockets support advanced conifer regeneration and at one time contained the heron colony for which the ecological reserve was established.

i) Selective logging in 1931 left young Douglas-fir and western hemlock standing, which have now grown into the codominant tree stratum. Very little western red cedar regeneration is visible. Spiny wood fern is extremely dense.

j) This western gully has side slopes of 40% with exotic garden species entering from the neighbouring homes.

8 Douglas Fir - Bracken - Stokesiella oregana Association

The cool dark atmosphere, tall timber, and thin shrub strata makes this one of the most attractive vegetation associations on the Endowment Lands.

The tree canopy is dominated by Douglas-fir with infrequent and significantly shorter individuals of western hemlock and western red cedar.

The shrub strata is poorly developed because of the low light levels reaching the forest floor. Changes in the shrub strata will be insignificant until an opening is created in the tree canopy.

Characteristic Species

Trees:	Douglas-fir Western red cedar
Shrubs:	Salal Western hemlock Red huckleberry
Ferns:	Bracken Spiny wood fern
Herbs:	Trailing blackberry
Moss:	Stokesiella oregana Plagiothecium undulatum

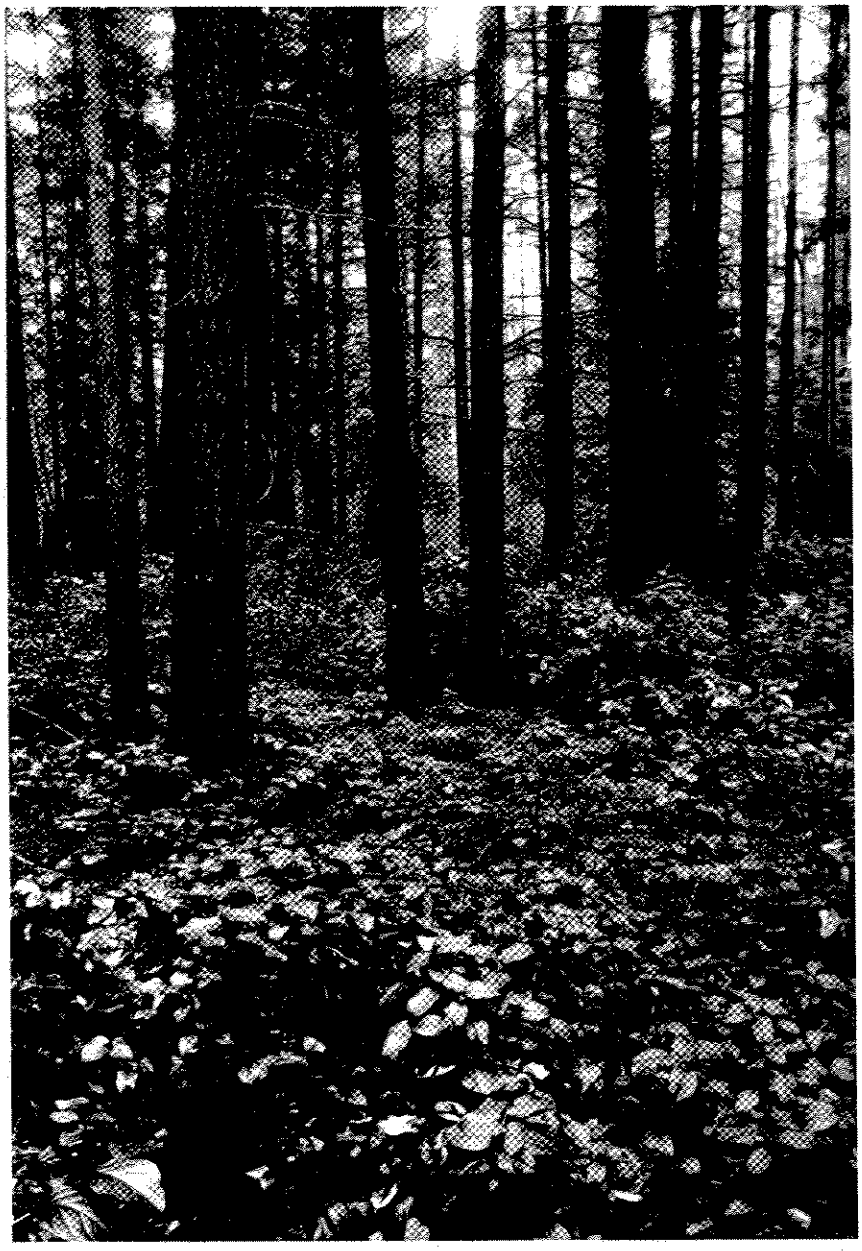
Mosses

Epixylic mosses are Stokesiella oregana, Plagiothecium undulatum and Hypnum circinale.

EISG No. 1.3

Mensuration Data

	Douglas-fir
Age:	75-80 yrs
Height:	39-42 m
Diameter:	50-70 cm



The tree strata of this association are entirely Douglas-fir. Shrub strata are poorly developed. In the centre of the photograph is a burnt snag remaining from the brush fire that spread through this area following logging.

Distribution

This is an even-aged association forming a fringe along the perimeter of the larger Douglas-fir - Salal - Plagiothecium undulatum association. They share the same history; clearcut logged with minimal soil disturbance followed by an intense fire which burned significant amounts of the logging stumps.

Douglas-fir is a moderately shade tolerant tree species. This means that it germinates and develops best in full or direct sunlight. Large Douglas-fir creates a dark environment below its canopy that precludes germination of its own seed. Western hemlock and western red cedar, both of which are significantly more shade tolerant than Douglas-fir, are the two tree species which are expected to form the shrub strata in the coming years.

Because of this shade tolerance Douglas-fir usually forms even-aged stands. Each of the individuals will have germinated within a few years of each other. Those trees which germinate late or are not able to compete for sunlight as effectively as its neighbours will be overtopped and eventually die. This contrasts sharply with mixed-aged stands. Western hemlock and western red cedar are both able to tolerate shade as juveniles and as older trees. Thus they are able to germinate and survive beneath the canopies of their parent trees which creates the diversity of ages and tree sizes found in mixed-aged stands.

This association and association nine are both very good examples of even-aged stands. Tree ages are seventy-five to eighty years and most of the individuals are in the same height and diameter classes. Those trees which are significantly smaller in height and diameter are now dead.

This association and association nine will not change significantly for many years. Western hemlock is only now beginning to seed in below the canopy. These young seedlings will grow very slowly until an opening in the tree canopy is created. Such an opening will be the result of the death of a taller Douglas-fir. For a period of fifty years suppressed hemlock will react markedly to a sudden increase in light levels. When this occurs these suppressed trees will rapidly fill in the niche that has been made available. After many years these associations will become a mixed stand of tall, old Douglas-fir with a major component of western hemlock of mixed ages and a variety of heights and diameters.

Soils

Soil Series:	Sunshine
Humus Form:	Mor
Moisture Regime:	Mesic

This is a well drained soil which allows for excellent root growth. Even during wet winters the water table remains below one metre of the surface.

Variations

No major variations were found within this association.

Map Units

This association does not contain separate map units.

9 Douglas Fir - Salal - Plagiothecium undulatum Association

This is the largest vegetation association on the Endowment Lands. It is also one of the most popular, intensively used regions which can be seen by the number of trails in this one association alone. Shrub strata are undeveloped initially due to low light levels. Heavy public use through this open understory has also restricted development of vegetation.

The tree strata are composed of Douglas-fir with a minor constituent of western hemlock. The hemlock shows no outward signs of attack by dwarf mistletoe (Arceuthobium campylopocum).

The shrub strata are undeveloped with little variety of species and low cover classes. All of the shrub species appear in the low stratum.

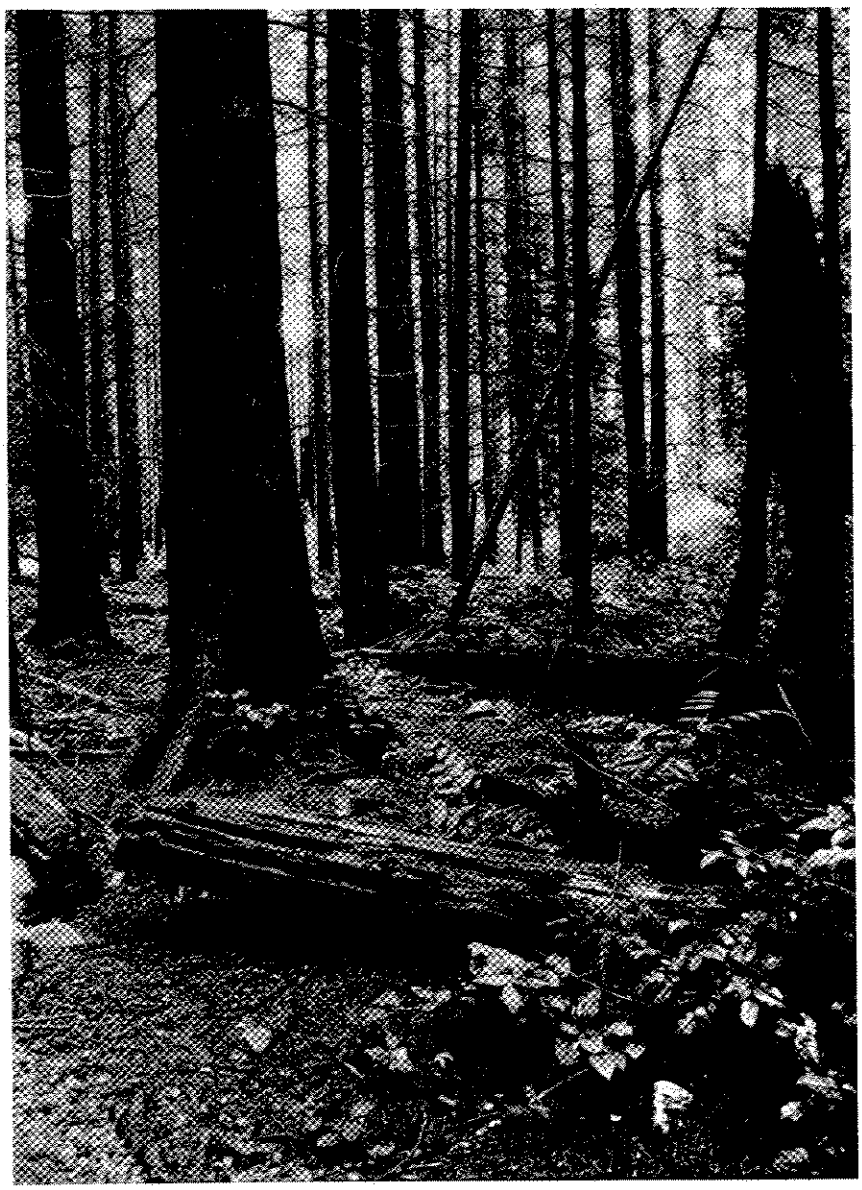
Characteristic Species

Trees:	Douglas-fir Western hemlock
Shrubs:	Salal Red huckleberry Western hemlock Western red cedar
Ferns:	Spiny wood fern Bracken
Herbs:	Trailing blackberry
Mosses:	Plagiothecium undulatum Stokesiella praelonga Mnium glabrescens

Mosses

Epixylic mosses include Mnium glabrescens, Plagiothecium undulatum, Dicranum spp., Isothecium elegans, and Hypnum circinale. The liverwort, Lepidozia reptans, is common as an epiphytic species.

EISG No. 1.4



At the left of this photograph is an example of the western hemlock found in this association. This association was also burnt at the turn of the century following logging.

Mensuration Data

	Douglas-fir	Western Hemlock
Age:	75-80 yrs	65-75 yrs
Height:	35-45 m	35-40 m
Diameter:	50-75 cm	35-40 cm

Distribution

The majority of this association occurs in a large block south of 16th Avenue with smaller units dispersed over the Endowment Lands. This is a stand of second growth timber established following logging at the turn of the century. The large, heavily burned stumps and evidence of soil scorching imply that an intense fire occurred in these regions following logging. The even-aged nature of this stand suggests that the fire burned the slash left after the logging of virgin timber. The fire would have eliminated all deciduous shrubs and bared mineral soil which aids the survival and development of Douglas-fir, a relatively shade intolerant species.

Soils

Soil Series:	Bose
Humus Form:	Mor
Moisture Regime:	Mesic

These well drained sites allow for good rooting depth and vigorous plant growth. Even during wet periods the water table rarely approaches within 75 centimetres of the surface.

Variations

No major variations were found within this association.

Map Units

9a) This unit was spared from the selective logging of 1931. The break running north-south is an extension of Pioneer Road which was widened during logging. The road right-of-way running parallel to the golf course was cleared in 1931 but subsequently abandoned.

b) These pockets contain red alder and dense shrub strata, a result of full sunlight reaching the forest floor in these narrow units.

c&d) These two units, separated by a low wet association, make up the majority of this association. In some portions the tree canopy is so dense all that is on the ground are dead branches and dried western hemlock cones.

e) The major sub-unit straddles a ridge which provides better soil drainage than the neighbouring units. The well drained soil of this ridge is an important requirement of Douglas-fir.

f) The timber surrounding these two sub-units was removed prior to 1931, when these stands were not of merchantable size. The shrub strata are undeveloped while bigleaf maple and bitter cherry appear in the tree strata. The fire of 1919 skirted around this unit saving what at that time was young Douglas-fir regeneration.

g) Similar to unit 9e, this area contains moderately well drained soil.

10 Western Hemlock - Mnium glabrescens Association

This is the only association dominated by western hemlock on the Endowment Lands. This association supports western red cedar as a minor tree species and red alder appears occasionally.

Western hemlock and western red cedar regeneration are found in both shrub strata.

Salal and red huckleberry cover most of the stumps and decaying logs in this association. Nurse logs also support scattered conifer seedlings.

Characteristic Species

Trees:	Western hemlock Western red cedar
Shrubs:	Western hemlock Salal Red huckleberry
Ferns:	Spiny wood fern Sword fern
Moss:	Mnium glabrescens Plagiothecium undulatum Stokesiella praelonga Stokesiella oregana

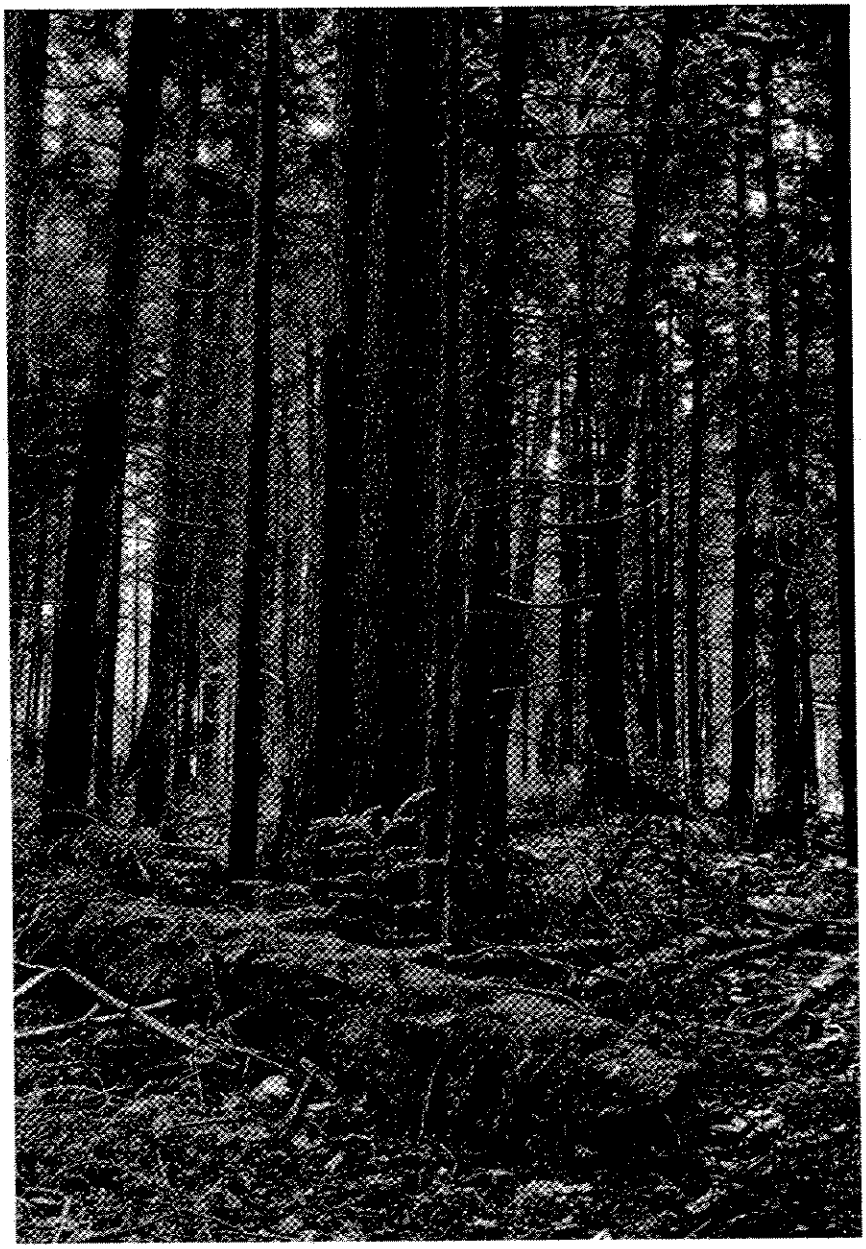
Mosses

Epiphytic moss: Dicranum spp., Stokesiella praelonga. Epixylic moss: Plagiothecium undulatum, Stokesiella praelonga, Rhytidiadelphys loreus, Mnium glabrescens, Hylocomium splendens, Dicranum spp.

EISG No. 1.5

Mensuration Data

	Western Hemlock
Age:	55-75 yrs
Height:	30-35 m
Diameter:	45-80 cm



The decaying nurse log in the foreground is supporting western hemlock seedlings. Note the persistence of dead branches on the older hemlock.

Distribution

Most of this association is found along SW Marine Drive with smaller pockets to the north. Old logging stumps and its age imply that this association has developed following logging.

Soils

Soil Series:	Bose/Sunshine
Humus Form:	Mor
Moisture Regime:	Hydric

This soil description is valid for all of the association except for the older unit (10c) in the southwest corner. Here the following description is more accurate:

Soil Series:	Heron
Humus Form:	Histomor/Moder
Moisture Regime:	Subhydric

Variations

The oldest unit, 95 years of age, occurs in the southwest corner near Marine Drive. This is a wet site with Heron soils and a Histomor humus form and is the remainder of a logged western red cedar stand. The original skid trails are still evident today.

Map Units

10a) Hemlock is the predominant tree species but there are small breaks in the canopy where groves of bigleaf maple, red alder, or Douglas-fir are found. This unit is well drained except for ponding along Chancellor Boulevard. There is also some yew (Taxus brevifolia) in the taller shrub stratum.

b) Untouched by the selective logging prior to 1930, this unit still shows evidence of burnt western red cedar and Douglas-fir stumps.

c) Western red cedar is 95 years old and 35 metres in height. Stumps up to 250 centimetres have become the microsites on which the dominant western hemlock have germinated. Vine maple is dense in both shrub strata.

d) Vegetation is similar to unit 10c but with less vine maple in the shrub strata.

e) Western hemlock and Douglas-fir are 55 to 80 years of age and up to 40 metres tall. Sub-units below SW Marine Drive experience standing water over much of the year.

f) This unit contains a higher concentration of Douglas-fir than the rest of the association. Vine maple is dense in both shrub strata.

11 Western Red Cedar - English Holly Association

Although dominated by western red cedar, Douglas-fir is an associated species on dry sites. On wet sites the associated species is red alder.

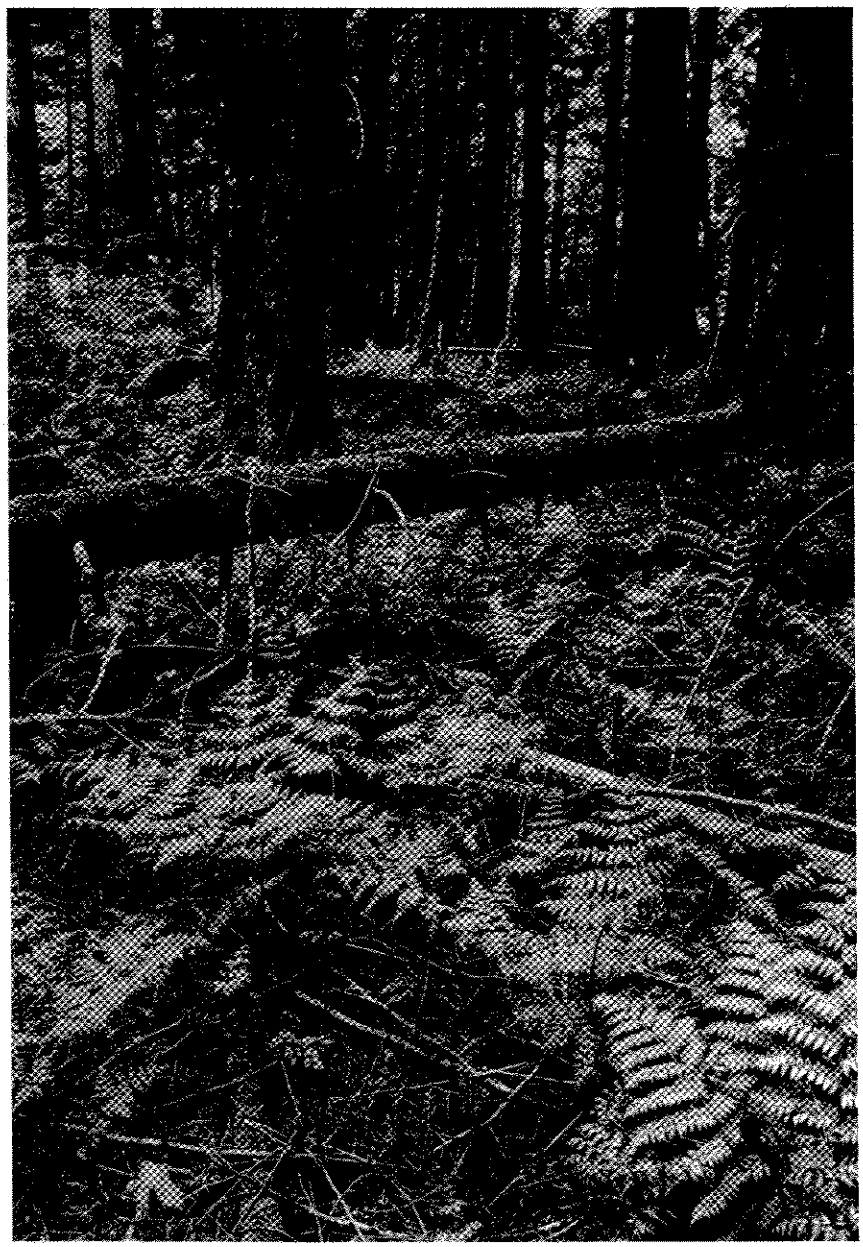
Western red cedar and red huckleberry are dense on old logging stumps and logs and there is also a moderate cover of western hemlock seedlings and spiny wood fern on these microsites.

English holly is found throughout this association. This shrub is an exotic, likely introduced by birds and garden refuse. Overall the shrub strata lack a well developed character due to cedar's dense canopy.

Characteristic Species

Trees:	Western red cedar
Shrubs:	Western red cedar Western hemlock Salal Salmonberry Red huckleberry English holly
Ferns:	Spiny wood fern Deer fern
Moss:	*Plagiothecium undulatum* *Mnium glabrescens* *Stokesiella praelonga*

EISG No. 1.5



Spiny wood fern is common in this association. Note the single english holly at the right of the photograph.

Mensuration Data

	Western Red Cedar
Age:	65-80 yrs
Height:	25-35 m
Diameter:	40-70 cm

Distribution

This association occurs predominantly in wetter pockets south of Imperial Trail. The old burnt western red cedar stumps indicate this association's logging history and past stand composition.

Soils

Dry Sites:	Soil Series:	Bose
	Humus Form:	Moder/Histomoder
	Moisture Regime:	Hygric
Wet Sites:	Soil Series:	Heron
	Humus Form:	Histomoder
	Moisture Regime:	Subhydric

Even in the drier sites the water table is within 50 centimetres of the soil surface. In the wet sites, the water table is perched or within 20 centimetres of the surface, with an LFH horizon of 10-15 centimetres of muck.

Variations

Variations are attributable to differences in soil moisture. In dry sites, Douglas-fir appears as scattered individuals, 25-30 metres in height and overtops western red cedar. In sites with standing water, Douglas-fir is replaced by red alder, 22 metres tall. These sites also support skunk cabbage.

Map Units

11a) Most of the unit has a perched water table during the winter. Stumps indicate that the original stand was primarily western red cedar. The shrub strata are undeveloped.

b) Western red cedar is in the 101-120 year age class. A perched water table is common.

c) The northern sub-unit has a slope of five percent which allows for moderate drainage. Dry microsites support Douglas-fir. In the southern unit, the water table can be perched and drier microsites here are occupied by red alder. Both sub-units are subject to windthrow.

d) Western red cedar is predominant in the tree strata but the canopy is broken by the occasional Douglas-fir, red alder, bigleaf maple, bitter cherry, and white birch. Vine maple is dense in the shrub strata. European mountain ash occurs in the shrub strata. The water table is 50 centimetres below the surface.

12 Western Hemlock - Douglas Fir - Stokesiella Praelonga Association

This is an old association similar in appearance to the Endowment Lands prior to logging. This is a dark, wet association dominated by large conifers and a dense understory.

The tree strata are dominated by Douglas-fir but with a large component of western hemlock and western red cedar. Sitka spruce (Picea sitchensis) appears as large old individuals, many of which have been attacked by sitka spruce weevil (Pissodes sitchensis). There is also a heavy infestation of dwarf mistletoe on virtually all western hemlock. A few individuals of mature grand fir (Abies grandis) can be seen along SW Marine Drive. The tufted tops that these trees display is due to attack by the balsam woolly aphid (Chermes picea).

Vine maple is very dense in the shrub strata making travel difficult.

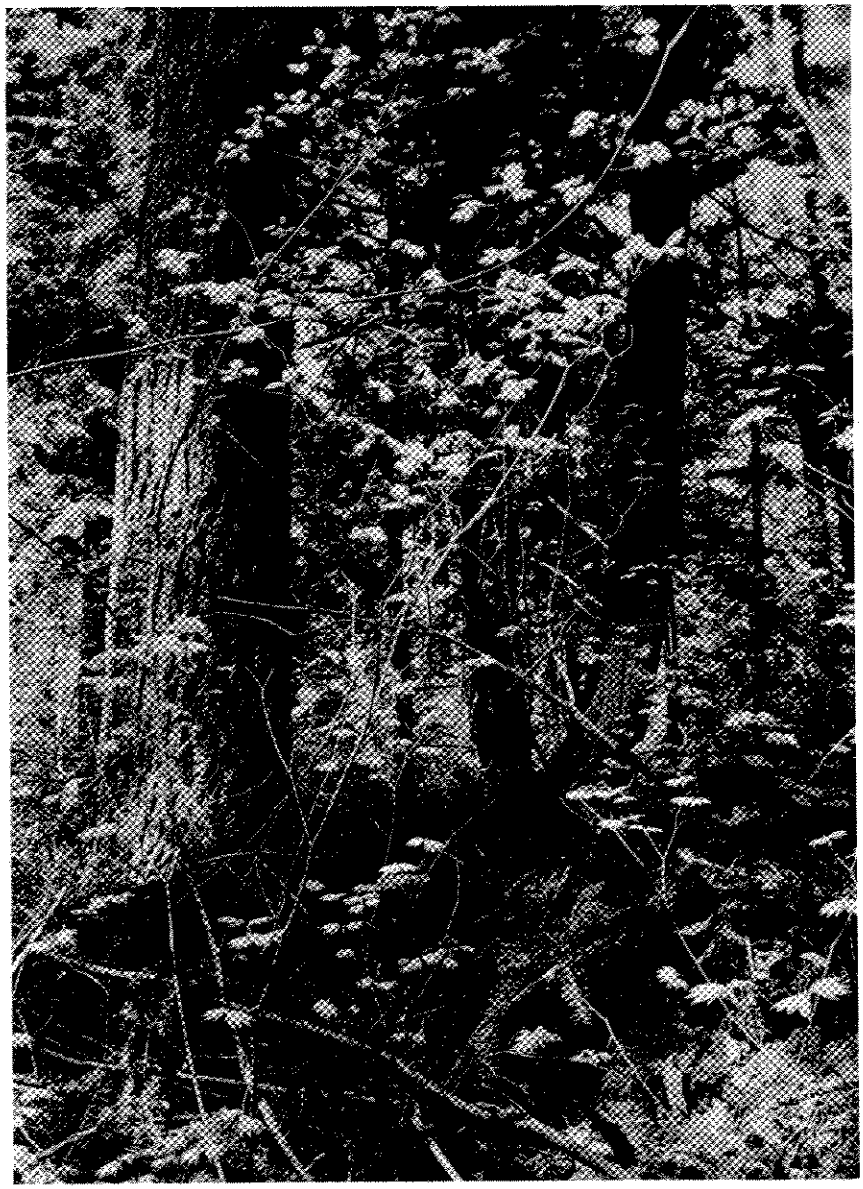
Red huckleberry and salal are sparse on stumps and logs. Western hemlock seedlings are dense on many nurse logs.

Characteristic Species

Trees:	Douglas-fir Western hemlock Western red cedar
Shrubs:	Western hemlock Western red cedar Salal Vine maple
Herbs:	Skunk cabbage
Ferns:	Sword fern Spiny wood fern Deer fern
Moss:	Stokesiella praelonga Plagiothecium undulatum

Mosses

Epixylic moss: Plagiothecium undulatum, Mnium glabrescens, Dicranum spp.



A large Douglas-fir is at the right of this photograph with a western hemlock to the left and a western red cedar well hidden in the centre background. The abundance of vine maple foliage during much of the year creates a very dense shrub strata.

EISG No. 2.6

Mensuration Data

	Douglas-fir	Western Hemlock
Age:	95-130 yrs	100-110 yrs
Height:	40-50 m	35-45 m
Diameter:	70-90 cm	50-80 cm

Distribution

This association is restricted to the wet sites near Marine Drive and the western boundary of the Endowment Lands. This area was selectively logged at the turn of the century which has produced stands with patches of open tree canopy. It is in these openings where vine maple is dense, hampering the survival of tree seedlings. Large old tree stumps are common.

The sitka spruce weevil attacks and kills terminal shoots of young trees. When the terminal shoot is damaged the uppermost lateral branches will replace the lost terminal. Very few large spruce on the Endowment Lands are without major forks below their crown. This evidence supports the theory that the spruce weevil was active when these trees were younger.

The western hemlock of this association display severe branch brooming on all trees. The older trees also exhibit fusiform swelling of both branches and stem.

Soils

Soil Series:	Heron
Humus Form:	Mor
Moisture Regime:	Hygric

Drainage is fair to poor with the water table 30-50 centimetres below the surface. Some cementation may be found at 50 centimetres.

Variations

No major variations were found within this association.

Map Units

This association does not contain separate map units.

13 Western Red Cedar - Western Hemlock - Sitka Spruce Association

In this old, mixed association western hemlock and western red cedar replace Douglas-fir as the dominant tree species. Sitka spruce is more common than in the Western Hemlock - Douglas-fir - Stokesiella oregana association. The spruce has been seriously damaged by the sitka spruce weevil. Dwarf mistletoe infection is found in each mature specimen of western hemlock. Here too the tree canopy is broken, but in this asociation salmonberry fills this open niche occupied by vine maple in association twelve.

Western hemlock and western red cedar regeneration appear in both shrub strata, some times at very high levels.

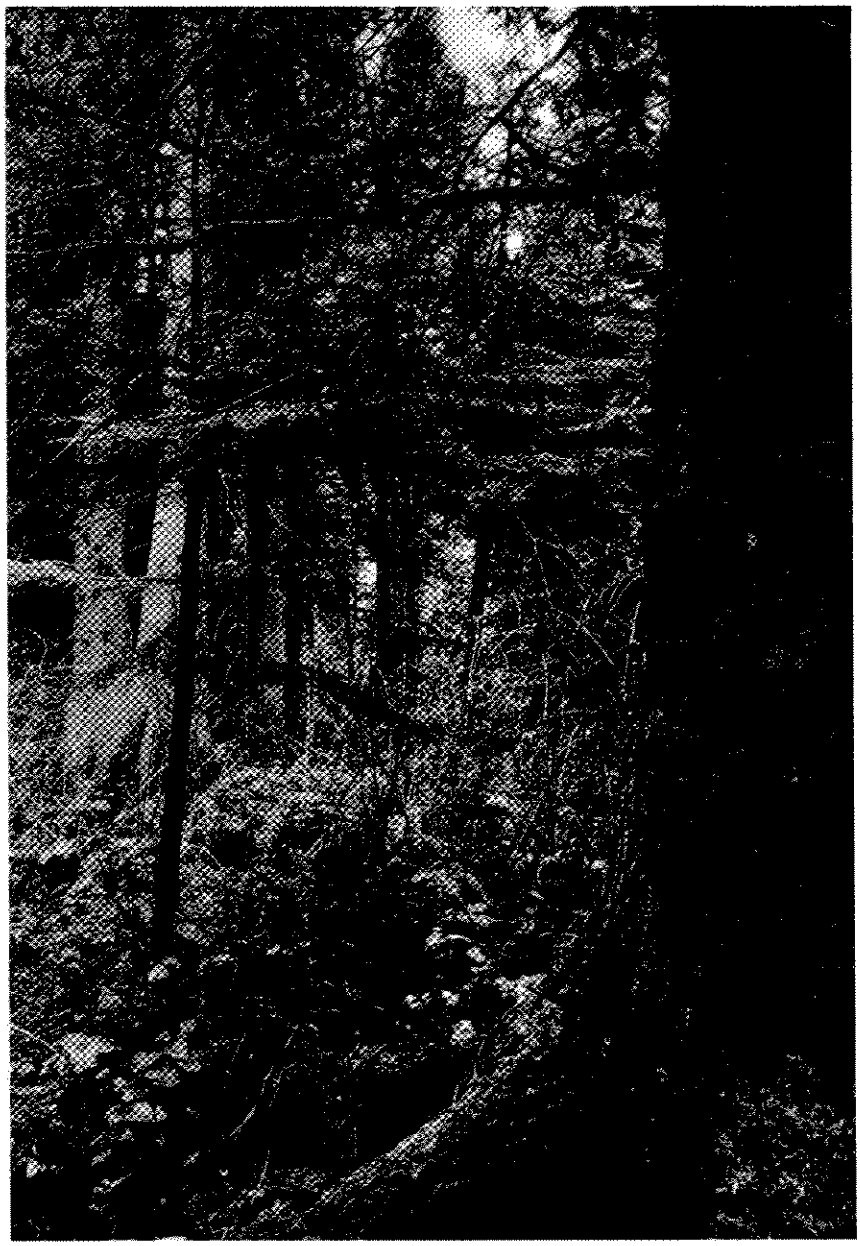
Again, in this association much of the shrub species are found on decaying wood. Red huckleberry and salal cover some of the stumps and logs, most of the western hemlock and western red cedar seedlings occur on nurse logs.

Characteristic Species

Trees:	Western hemlock Western red cedar Sitka spruce
Shrubs:	Western hemlock Western red cedar Salmonberry Salal
Herbs:	Spiny wood fern Sword fern Deer fern
Moss:	Stokesiella praelonga Mnium glabrescens Plagiothecium undulatum

Mosses

Epixylic moss: Mnium glabrescens, Plagiothecium undulatum, Rhytidiadelphus loreus, Stokesiella praelonga, Hypnum circinale. Lepidozia reptans occurs as an epixylic liverwort.



Sitka spruce in the right foreground and left background are quite common. Salmonberry cover is dense while vine maple is absent from the shrub strata.

ESIG No. 2.5

Mensuration Data

	Western Hemlock	Western Red Cedar
Age:	95-120 yrs	100-103 yrs
Height:	34-40 m	30-40 m
Diameter:	50-80 cm	40-90 cm

Distribution

This association is found south of Imperial Trail on wet sites that have been previously logged. Stumps show that the original stand was predominantly large western red cedar.

Soils

Soil Series:	Heron
Humus Form:	Mor/Moder
Moisture Regime:	Subhydric

The LFH horizon is 10-15 centimetres of black muck. The association is characterized by standing water or a water table within 25-45 centimetres of the surface.

Variations

No major variations were found in this association.

Map Units

13a) Western red cedar regeneration is minimal.

b) The extremely dense shrub strata, mostly vine maple, is a result of the open tree canopy caused by heavy windthrow.

c) The age of this unit is twenty years less than the rest of the association although tree heights are similar. Of the ferns only spiny wood fern is common.

d) Because of proximity to the old road cut this unit contains some cascara and mountain ash. Salmonberry is more prominant than other units in this association.

14 Pacific Crabapple - Hardhack - False Lily of the Valley - Skunk Cabbage Association

The dominance of pacific crabapple (Malus fusca) in the shrub and tree strata creates a very dense association.

Associated species of this association include: willow spp., salal, sedges (Carex spp.), Stokesiella oregana, and Mnium spp.

Characteristic Species

Trees:	Pacific crabapple
Shrubs:	Pacific crabapple Hardhack Oval-leaved blueberry
Ferns:	Spiny wood fern Bracken
Herbs:	Skunk cabbage False lily-of-the-valley

EISG No. 3.6

Distribution

This association occupies a relatively small area in the northeast corner of the bog. The association is subject to periodic flooding, particularly in the area west of Camosun Street, as is demonstrated by the number of ponds which are scattered throughout this area.

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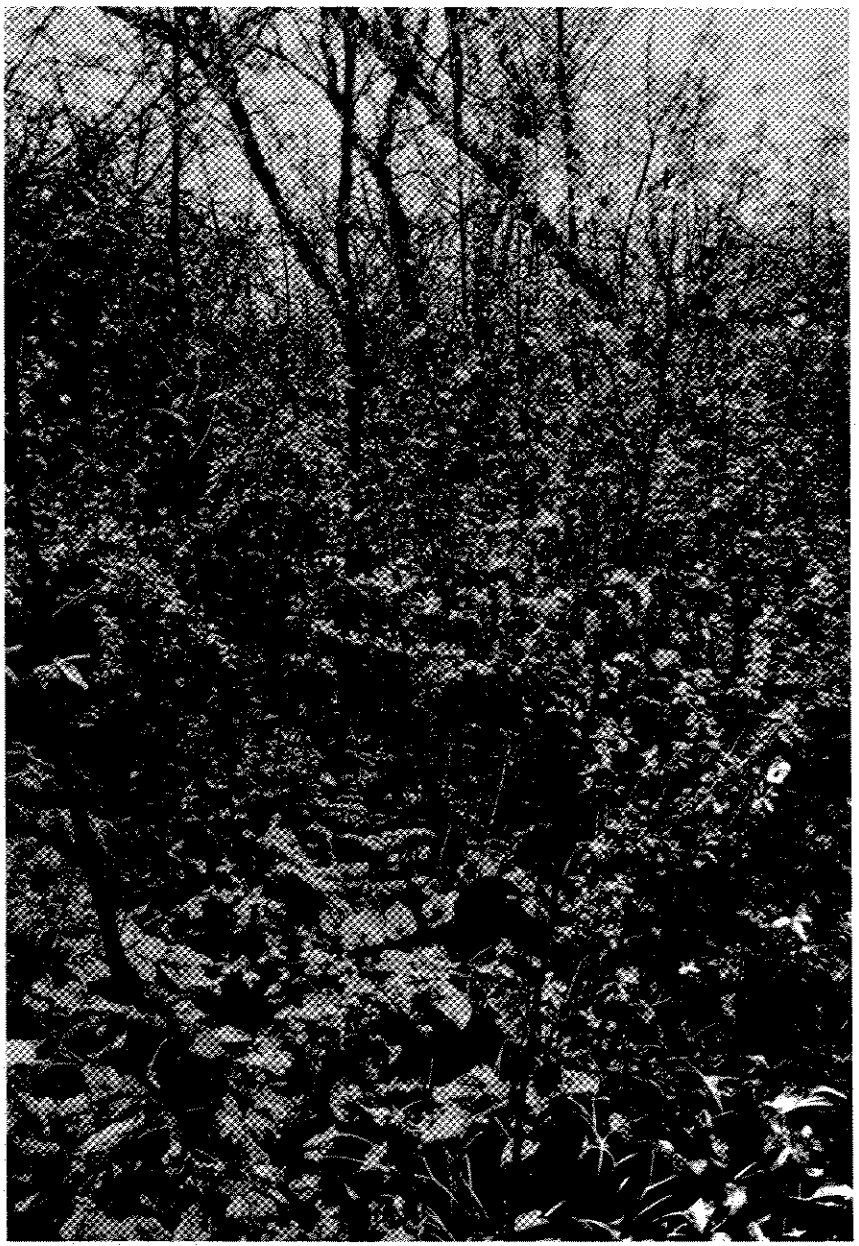
*Vegetation Associations #14-#20 are based upon COMEAU, M.A. 1983. Vegetation Classification and Ordination of Camosun Bog in the University Endowment Lands. Greater Vancouver Regional District Parks. 74 p.



The open deciduous tree canopy allows for a dense groundcover including false lily-of-the-valley and huckleberry. The northern edge of the association is flooded for most of the year and supports little groundcover.

15 Shore Pine - White Birch - Western Hemlock - Salal Association

The association is characterized by a relatively open, mixed stand of shore pine (Pinus contorta), white birch and western hemlock. Western hemlock is the dominant species in the tree canopy.

A single sitka spruce was found in the shrub layer of a fairly disturbed area.

Associated species include: mountain ash, pacific crabapple, cascara, oval-leaved blueberry (Vaccinium ovalifolium), and red huckleberry.

Characteristic Species

Trees:	Western hemlock Shore pine
Shrubs:	White birch Salal
Ferns:	Bracken
Herbs:	Bunchberry
Mosses:	Stokesiella oregana

EISG No. 2.3

Distribution

This association occurs on the northern limit of the post glacial lake from which the bog formed. It occupies a relatively small area between the Western Hemlock - Red Huckleberry - Plagiothecium undulatum association to the west and south, the Western Hemlock - Salmonberry association to the northwest and associations 14 to the north and east. This vegetation association is probably the result of continuing disturbance due to its close proximity to the school, to Camosun Park and to the subdivision east of Camosun Street. In time, this association will likely proceed to an association with a relatively closed tree canopy of western hemlock and a sparse understory. Already the hemlock are beginning to overtop the pine. Many of the pine are dead or dying because of the competition from the hemlock.

This association occurs at the northern edge of the historical extent of Camosun bog. It is representative of changes in the area caused by drainage. Salal now dominates the shrub strata and excludes bog species. Hemlock is overtopping the pine, which is the more typical bog tree.

16 Western Hemlock - Salmonberry Association

Many of the trees in this association, particularly western hemlock, occur on hummocks. The hummocks are probably fallen trees which are slowly decomposing and have gradually become covered with forest litter and dying plants. These hummocks and the newly fallen trees effectively block any drainage of seasonal water from this part of the bog with the result that small ponds form.

Although not present in the western part of the bog, skunk cabbage was found to occur in many of the ponds of the eastern section of this association.

The associated species of this association include western red cedar and salal.

Characteristic Species

Trees:	Western hemlock Shore pine
Shrubs:	Salmonberry Red huckleberry Oval-leaved blueberry
Ferns:	Lady fern
Mosses:	Isothecium spiculiferum Plagiothecium undulatum

EISG No. 2.5

Distribution

This association occupies a relatively narrow strip of land along the western edge of the bog. In addition it is also found in a small area south of and adjacent to the landfill on the east border of Camosun Bog. The eastern boundary of this association marks the shoreline of the original post glacial lake from which the bog has formed.

This association occurs outside of the actual area of the bog. Historically, it may have been an ecotone between forest and bog, as evidenced by the presence of pine in the canopy.

18 Western Hemlock - Salal - Labrador Tea Association

This association is characterized by a thick cover of shrub species, in particular, salal, and by a lack of any trees. Western hemlock and swamp laurel (Kalmia polifolia) are found in the shrub layer. Hardhack becomes very abundant towards the southern half of the association.

This association is also characterized by an apparent lack of herbs.

Characteristic Species

Shrubs:	Western hemlock Salal Labrador tea Swamp laurel Oval-leaved blueberry Pacific crabapple
Mosses:	Pleurozium schreberi Sphagnum sp.

EISG No. 1.6

Distribution

This association extends approximately seven metres on either side of the B.C. Hydro powerline running north to south through Camosun Bog.

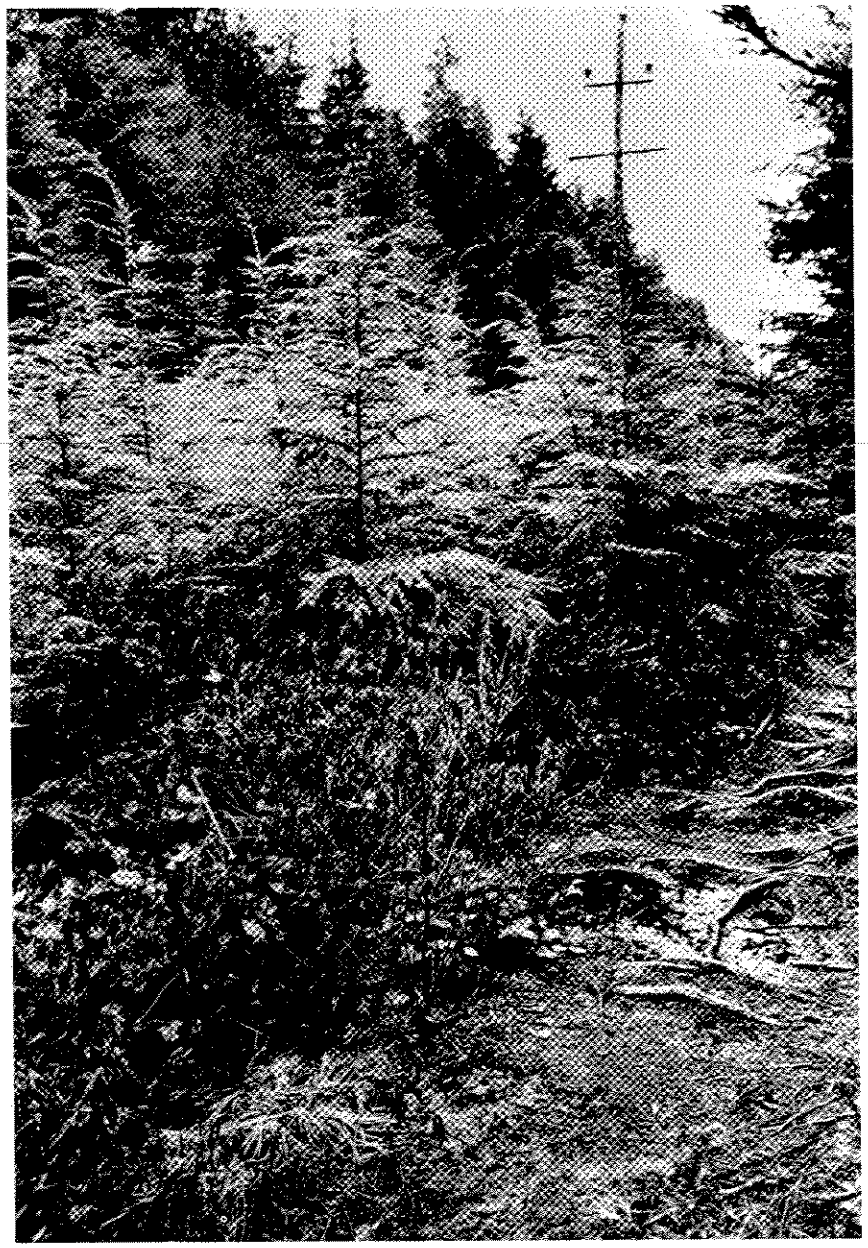
Variations

In the one small northern variation western hemlock is absent and labrador tea (Ledum groenlandicum) is abundant. This variation lacks any mosses but bracken occurs in the herb layer.

Map Units

18a) This is the small northern variation.

b) This unit represents the main body of the association.



This association is cleared periodically in the maintenance of the powerline. Otherwise it would mature into Association 17.

Chapter VI: SUMMARY

The vegetation of the Endowment Lands is only a remnant of the forests which once dominated the Fraser Valley. Contained within its boundaries are examples of the floral development found throughout the Lower Mainland and southern Vancouver Island. Among these are abandoned pasture land, mixed deciduous forests, immature conifer forests, and an example of the potential climax forest. Nowhere else in the Lower Mainland is such a diverse collection of woodlands found together in a single parcel of land.

This report is only the first step in studying and quantifying the vegetation of the Endowment Lands. Additional studies will examine management of the plant associations and also the relationship of wildlife to the vegetation.

While exploring the Endowment Lands a pattern in distribution of vegetation emerges. The age of plant communities increases from north to south. For instance between Spanish Banks and Chancellor Boulevard is a large stand of immature red alder approximately thirty-five years of age. A little farther south, straddling 16th Avenue, are the large Douglas-fir associations which are seventy-five years of age. Located in the south and west corner, along South West Marine Drive, are mature conifers one hundred fifty to three hundred years of age, representative of the coastal climax forest.

Without previous development the Endowment Lands would now be entirely covered by a mature conifer forest. In itself the conifer forest is attractive but it lacks variety of plant species. The tightly packed tree canopy of the mature conifer forest intercepts direct sunlight so effectively that the shrub strata are severely suppressed. Such a homogeneous forest makes up only a portion of the entire area. Various disturbances, most notably logging, fire and clearing, have resulted in the present diversity of the forest.

The location of the Endowment Lands, sandwiched between the University of British Columbia and the urban centre of Vancouver, provides a unique opportunity for exploration of a wild forest easily accessible by public transit. Taking advantage of the all weather trail system an explorer may discover: Camosun Bog, a grove of trembling aspen, students from U.B.C. in an outdoor class, a corduroy road, nesting great blue herons, an abandoned farm, ideal mushroom and berry picking, and perhaps even a black-tailed deer.

The Endowment Lands are truly a unique and special place.

APPENDICES

APPENDIX 1

FEATURES OF SPECIAL INTEREST

PLAINS OF ABRAHAM

The Plains of Abraham, above Spanish Banks, are all that remains of John Stewart's dairy farm. The dairy pasture was first cleared in 1909, but is now being slowly overtaken by the surrounding forest. The foundations of the farm buildings can still be seen just inside the timber on the south side of the meadow.

PIONEER TRAIL

The section of Pioneer Trail north of Chancellor Boulevard was originally the road into Stewart's dairy farm. Along some points, the original corduroy road can still be seen. This method of road construction used sections of logs set transversely to the direction of travel.

HERONRY

The Endowment Lands supports one of the largest colonies of Great Blue Herons (Arden herodius) in the Lower Mainland. In 1970, 120 nesting pairs were recorded near Marine Drive. Ninety hectares were set aside in December of 1975 as the Great Blue Heron Nesting Place, Endowment Lands. This Ecological Reserve is bounded by S.W. Marine Drive on the south, Imperial Trail on the North, the Endowment Lands boundary to the west and Salish Trail to the east. In 1979 the herons left this old colony and formed a new one in the eastern section of the Endowment Lands. In early morning the mature herons can be seen heading south to feed along the mudflats of Iona Island and the Endowment Lands foreshore.

ASPEN GROVE

Along Top Trail near Imperial Drive there is a small grove of trembling aspen (Populus tremuloides). This species, although rare, is a native of the Fraser Valley. There are not many specimens remaining in the Lower Mainland, most having been removed during the development of farmland along the Fraser River. In the summer of 1983 red alder which was shading the trembling aspen were removed. Although one of the aspens has since died at least half a dozen root suckers have now sprouted. The grove looks in fine shape and should survive for many years.

GRAND FIR

Grand fir (Abies grandis) is found along SW Marine Drive in the western corner of the Endowment Lands. The mature trees have tufted tops, symptom of attack by the Balsam Woolly Aphid (Chermes picea).

APPENDIX 2

POINT GREY FIRE OF 1919

'POINT GREY HOMES ENDANGERED BY BUSH FIRE'
(from VANCOUVER DAILY SUN, JULY 17, 1919)

Fanned into fresh and decidedly dangerous activity by the brisk northwesterly gale which sprang up early last evening the bush fire in Point Grey, which was considered under control yesterday after having burned over some 500 acres and at 2 o'clock this morning was seriously menacing the easterly residential district of Point Grey, despite the strenuous efforts of some 200 men who were making heroic efforts to check the spreading flames.

Spreading westward from Sasamat Street, which had marked the easterly spread of the fire on Wednesday night - when it was checked by "backfiring" a large tract - the flames were at an early hour this morning spreading rapidly towards two blocks containing about a score of fine residences. The seriousness of the situation for these residents may be judged from the fact that the nearest home to the advancing wall of flame and smoke was only half a block from the blaze.

Point Grey residents from all sections of the municipality turned out in force to supplement the efforts of the provincial fire rangers who made such a valiant stand against the fire during last Monday, Tuesday and Wednesday. The entire strength of the Point Grey fire brigade was out battling the flames and crews from two of the outlying fire halls in the city were ordered to hold themselves in instant readiness to turn out if the spread of the fire continued. The situation at an early hour was that the fire was in places near Twenty-first Avenue only three blocks from the city boundary at Alma Road and if it should cross that thoroughfare and work southward - as the northerly veer of the gale threatened a number of outlying city homes would also be menaced.

The 500 acre tract which the fire has already devastated extends from Twenty-ninth Avenue on the south to Nineteenth Avenue on the north, and from Imperial Street on the west to Highbury Street on the east. The high wind which prevailed all night carried sparks and burning embers to a surprising distance and made it almost a terrifying task to attempt to fight the flames, for while the fire rangers and their voluntary aids would be battling with burning stumps on their front, they would suddenly find that the fire had spread to several hundred yards in their rear and started up afresh.

There is just one fact in connection with the situation and that gives promise of getting the spread of the fire stopped and that is the presence of a good water supply in the district into which the fire is

now spreading. But even with many streams playing on the burning bush, the strong wind makes it a very difficult task to get it under control.

Up to 2:30 this morning one small house had been burned down and the residents in about a dozen others along Sasamat and Highbury Streets believed that their homes were doomed to destruction. The furniture and contents were being removed from these houses by many willing hands who braved showers of sparks and the heat and smoke of the approaching flames to save the goods and chattels of the residents.

A large number of people phoned up The Sun last evening and asked about the fire on the Kitsilano Indian reserve. The Harbor Commission is clearing land on this property, and with the high wind that sprung up last night the fire began to spread a little. No. 7 fire hall was accordingly called out, and successfully succeeded in protecting all the homes and the property that were in any danger.

At 11:35 last night No. 4 hall responded to a call to a bush fire near the Rat Portgage Lumber Company's mill. The blaze proved to be only a small one, and the department soon had it under control.

A small fire believed to have started from a cigarette butt, was discovered on the sidewalk of the Granville Street bridge just south of the draw about 11:30 last evening. Halls Nos. 2 and 4 responded to the call and the fire was extinguished by 11:43.

Weekly Gazette

POINT GREY
RICHMOND

AND HOME NEWS

DELTA
FRASER VALLEY

Vol 11. No 22. ESTBD. SATURDAY, JULY 19th, 1919 1908 Single Copies 5c.—Yearly $1.50

Homes and Property Were Menaced By Bush Fires in West Point Grey

With their homes and property menaced by bush fires, residents in certain sections of West Point Grey have had an anxious time this week. The fire started in the timber in the vicinity of 29th avenue and Imperial street on Sunday and swept through the bush on hundreds of acres of government owned land before it was got under control by hundreds of men fighting the flames. At one time the flames were dangerously close to the Sacred Heart Convent and houses in the vicinity.

Driven by Gale

On Wednesday, after all danger from the fire was believed to have been over, a strong west wind swung up towards the evening, fanned the flames anew and carried them across the marshy ravine between Twenty-fifth and 21st avenues, Dunbar Heights. Once in the dry slashings and timber east of Crown street the fire rapidly made its way towards the homes of a large number of people in the blocks between Twenty-fifth and Twenty-first avenues and west of Bruce street to Highbury street.

The fire department was called about midnight and aided by scores of men put up a successful fight and by three o'clock Thursday morning had the flames in check. Many of the occupants of houses removed their belongings so certain did it appear that the fire would destroy their homes. Many of the homes in danger were saved solely through the valiant efforts of the volunteer workers.

Credit Due Firemen

Great credit is due Fire Chief Shannon and his men for the manner in which they handled the situation, and the effectiveness with which their efforts were directed.

Board of Trade Met In Regular Session

The Richmond and Point Grey board of trade held their regular meeting last Monday. No new business came before the meeting. A letter was received asking the endorsation of the

Reeve is Authorized To Attend Convention

Reve Fletcher was authorized by the Point Grey council on Tuesday night to attend the annual convention of the Union of Canadian Municipalities at Kington, Ont., August 13 to 14.

CANADIAN RED CROSS SOCIETY, VANCOUVER BRANCH

The following letter sent to Mrs. Waddell, chairman of the Richmond Red Cross, speaks for itself.

Dear Mrs. Waddell:—

It is with much pleasure I acknowledge the generous box of Red Cross supplies received today from the Richmond Red Cross. The workers of your excellent branch are to be congratulated on the way they are finishing up their Red Cross work, and doing it in the same splendid and careful manner as formerly. I can truly say that all supplies from the Richmond Red Cross have been a pleasure to receive, both as regards making, bundling, and packing, and they have a record that stands very high for general efficiency.

I note also the splendid hospital work in Ward "O" being accomplished by the same generous-hearted people, and the pleasure with which the boys receive the visits your Committee pays to them, speaks volumes for the kindness you extend to the patients at all times.

May I draw your attention to Ward "W" where Maher is now confined, and and ask if you will kindly arrange to see him through the window as no visitor is admitted to the ward? He would enjoy a small dish of ice cream, I am sure, and perhaps, strawberries.

Please advise me how you find him, and with kindest and best wishes to you all in your splendid work, believe me,

Yours faithfully,
MARGARET MILLS,
Superintendent, R. C. H.

People of Pt. Grey In Historic Peace Celebration Today

Scores of Gaily Decorated Cars Convey Children and Adults Through Streets of Vancouver

An Attractive Float

Municipal Officials and Residents Join with Fellow Citizens of Greater Vancouver in Historic Event

It is expected that Point Grey will be worthily represented in the great peace parade in Vancouver today. The committees having the arrangements in hand have been working hard and it is expected that the people's co-operation on this historic occasion will be manifested today. In order that Point Grey's showing may be worthy of the municipality and the occasion. It is hoped that all owners of automobiles will have them at the municipal hall, Kerrisdale by 9 o'clock this morning so that they will be available to convey the children of the municipality. All cars will be appropriately decorated it is expected.

Attractive Float.

The float for which the council appropriated $100 will be a most attractive one. Municipal Engineer Greig to whom was entrusted the responsibility of designing and constructing a suitable float has completed his task. The float is in form of a globe with the map outline of the Allied and associated nations worked in flowers. Surmounting the globe in the form of a dove in the attitude of alighting. Surrounding the globe are children in costume representing the allied nations carrying flags and holding ribbons running from the land each represents.

Reeve Fletcher and members of the council, municipal officials and school trustees will head the Point Grey contingent in the parade.

JOHNSON—OLIVER

A pretty wedding was solemnized at St. Mark's church, Kitsilano, by Rev. Canon Troop, on Saturday morning,

Secure Two Dwelling Houses as Temporary Bathing Headquarters

Accommodation for West Point Grey Bathers will be Provided West of Imperial Street

Minister's Telegram

Hon. T. D. Patullo Withholds Consent to Temporary Building on Beach Opposite Jericho Country Club

"Regret not in position to authorize temporary bathing house at Jericho beach. There are some complications regarding lease to Jericho Club which should be settled in any event. Think you should carry out permanent improvements on land leased by your municipality from government in accordance with understanding."

The receipt of a telegram worded as above from Hon. T. D. Patullo, minister of lands, by the Point Grey council the first of the week knocked into the dim and distant future all hope of having either a temporary or permanent bath house erected on the beach opposite the Jericho Country Club. It had been expected that the minister would grant permission to the council to build a temporary bath house, and for this expected permission the council waited for some weeks

Council Takes Action.

The matter came up before council on Tuesday night when after a somewhat protracted discussion and many suggestions as to the location of temporary bathing house quarters, it was decided on the recommendation of Councilor Arnold to lease from W. Simpson two dwelling houses on the west side of Imperial street for the remainder of the season, and to convert them into bathing houses.

Safest Beach

Considered Bylaws Dealing With The Tax Rate and Tax Sale Lands

New Rector to Preach First Sermon August 3

The new rector of St. Mary's church Kerrisdale, Rev. S. C. McGaffin will arrive from the east toward the end of the month and will assume his new duties almost immediately. While the exact date of Mr. McGaffin's arrival was not known at the time of going to press, it is known that he will conduct the services and preach his first sermon as rector of St. Mary's on Sunday, August 3, announcement to that effect having been made on Sunday last.

INTERNED ENEMY DIES; SUSTAINED INJURIES IN FIGHT

Deceased, Leo. Mueller, Formerly Operated Hair Dressing Establishment Here.

VERNON, B.C., July 12.—Leo. Mueller, an interned German prisoner, died this morning in the Vernon Jubilee hospital as the result of injuries received in a fight with another prisoner named Carl Wagner which took place at the interment camp on Tuesday evening. Before death Mueller signed a deposition exonerating Wagner, stating that he had butted him in the stomach. The force of the blow broke one of the vertebrae in Mueller's spinal column causing paralysis.

A coroner's jury brought in the following verdict: "We find that Leo. Mueller came to his death as the result of a broken neck received in a brawl with Carl Wagner, on or about 5 p.m., July 8 at the interment camp and further we consider the military authorities should have notified the civil authorities."

Mueller conducted a hair dressing establishment in Vancouver before the

At Tuesday night's meeting, the Point Grey council gave preliminary readings to the Real Property Tax By-law. The municipal fathers also passed bylaws sanctioning the sale of certain tax sale property.

The real Property Tax by law sets forth the tax rate for the current year as follows: Shaughnessy Heights, 30 mills; on improved lands elsewhere other than Shaughnessy Heights, 28 mills and on "wild" lands, 25 mills. The bylaw states that a levy of 16.83 mills is necessary to provide $333,846.31 for sinking fund and interest. On outstanding loans of the municipality; for maintenance of schools and for an extension to Magee school a levy of 5 mills is required to provide $97,975.41 to provide $132,806.23 for general revenue and improvements in Shaughnessy Heights, 8.32 mills on Shaughnessy lands, 8.32 mills on improved lands and 16.33 on "wild" land.

On and after November first, 15 per cent will be added to the current year's taxes not then paid.

Tax Sale Property.

The policy of the council in regard to the disposal of the tax sale property, now owned by the municipality, was discussed by the finance committee, and it was unanimously decided that in all cases where the original owner had relinquished the privilege of purchasing their former property, Point Grey returned soldiers should be given an opportunity of purchasing the property. It was further decided that a list of available property be supplied to the joint housing committee, and that the committee submit recommendations to the council.

Chairman Sykes of the housing committee stated that seventeen applications had been received from soldiers for lots near schools and it was expected that before the next meeting applications would be in from eight or ten others.

To Pay Interest and Sinking Fund Account

The Point Grey Council at Tuesday

APPENDICES

APPENDIX 1

FEATURES OF SPECIAL INTEREST

PLAINS OF ABRAHAM

The Plains of Abraham, above Spanish Banks, are all that remains of John Stewart's dairy farm. The dairy pasture was first cleared in 1909, but is now being slowly overtaken by the surrounding forest. The foundations of the farm buildings can still be seen just inside the timber on the south side of the meadow.

PIONEER TRAIL

The section of Pioneer Trail north of Chancellor Boulevard was originally the road into Stewart's dairy farm. Along some points, the original corduroy road can still be seen. This method of road construction used sections of logs set transversely to the direction of travel.

HERONRY

The Endowment Lands supports one of the largest colonies of Great Blue Herons (Arden herodius) in the Lower Mainland. In 1970, 120 nesting pairs were recorded near Marine Drive. Ninety hectares were set aside in December of 1975 as the Great Blue Heron Nesting Place, Endowment Lands. This Ecological Reserve is bounded by S.W. Marine Drive on the south, Imperial Trail on the North, the Endowment Lands boundary to the west and Salish Trail to the east. In 1979 the herons left this old colony and formed a new one in the eastern section of the Endowment Lands. In early morning the mature herons can be seen heading south to feed along the mudflats of Iona Island and the Endowment Lands foreshore.

ASPEN GROVE

Along Top Trail near Imperial Drive there is a small grove of trembling aspen (Populus tremuloides). This species, although rare, is a native of the Fraser Valley. There are not many specimens remaining in the Lower Mainland, most having been removed during the development of farmland along the Fraser River. In the summer of 1983 red alder which was shading the trembling aspen were removed. Although one of the aspens has since died at least half a dozen root suckers have now sprouted. The grove looks in fine shape and should survive for many years.

GRAND FIR

Grand fir (Abies grandis) is found along SW Marine Drive in the western corner of the Endowment Lands. The mature trees have tufted tops, symptom of attack by the Balsam Woolly Aphid (Chermes picea).

APPENDIX 2

POINT GREY FIRE OF 1919

'POINT GREY HOMES ENDANGERED BY BUSH FIRE'
(from VANCOUVER DAILY SUN, JULY 17, 1919)

Fanned into fresh and decidedly dangerous activity by the brisk northwesterly gale which sprang up early last evening the bush fire in Point Grey, which was considered under control yesterday after having burned over some 500 acres and at 2 o'clock this morning was seriously menacing the easterly residential district of Point Grey, despite the strenuous efforts of some 200 men who were making heroic efforts to check the spreading flames.

Spreading westward from Sasamat Street, which had marked the easterly spread of the fire on Wednesday night - when it was checked by "backfiring" a large tract - the flames were at an early hour this morning spreading rapidly towards two blocks containing about a score of fine residences. The seriousness of the situation for these residents may be judged from the fact that the nearest home to the advancing wall of flame and smoke was only half a block from the blaze.

Point Grey residents from all sections of the municipality turned out in force to supplement the efforts of the provincial fire rangers who made such a valiant stand against the fire during last Monday, Tuesday and Wednesday. The entire strength of the Point Grey fire brigade was out battling the flames and crews from two of the outlying fire halls in the city were ordered to hold themselves in instant readiness to turn out if the spread of the fire continued. The situation at an early hour was that the fire was in places near Twenty-first Avenue only three blocks from the city boundary at Alma Road and if it should cross that thoroughfare and work southward - as the northerly veer of the gale threatened a number of outlying city homes would also be menaced.

The 500 acre tract which the fire has already devastated extends from Twenty-ninth Avenue on the south to Nineteenth Avenue on the north, and from Imperial Street on the west to Highbury Street on the east. The high wind which prevailed all night carried sparks and burning embers to a surprising distance and made it almost a terrifying task to attempt to fight the flames, for while the fire rangers and their voluntary aids would be battling with burning stumps on their front, they would suddenly find that the fire had spread to several hundred yards in their rear and started up afresh.

There is just one fact in connection with the situation and that gives promise of getting the spread of the fire stopped and that is the presence of a good water supply in the district into which the fire is

now spreading. But even with many streams playing on the burning bush, the strong wind makes it a very difficult task to get it under control.

Up to 2:30 this morning one small house had been burned down and the residents in about a dozen others along Sasamat and Highbury Streets believed that their homes were doomed to destruction. The furniture and contents were being removed from these houses by many willing hands who braved showers of sparks and the heat and smoke of the approaching flames to save the goods and chattels of the residents.

A large number of people phoned up The Sun last evening and asked about the fire on the Kitsilano Indian reserve. The Harbor Commission is clearing land on this property, and with the high wind that sprung up last night the fire began to spread a little. No. 7 fire hall was accordingly called out, and successfully succeeded in protecting all the homes and the property that were in any danger.

At 11:35 last night No. 4 hall responded to a call to a bush fire near the Rat Portgage Lumber Company's mill. The blaze proved to be only a small one, and the department soon had it under control.

A small fire believed to have started from a cigarette butt, was discovered on the sidewalk of the Granville Street bridge just south of the draw about 11:30 last evening. Halls Nos. 2 and 4 responded to the call and the fire was extinguished by 11:43.

Weekly Gazette
AND HOME NEWS

POINT GREY
RICHMOND

DELTA
FRASER VALLEY

Vol 11. No 22. ESTBD. SATURDAY, JULY 19th, 1919 1908 Single Copies 5c.—Yearly $1.50

Homes and Property Were Menaced By Bush Fires in West Point Grey

With their homes and property menaced by bush fires, residents in certain sections of West Point Grey have had an anxious time this week. The fire started in the timber in the vicinity of 29th avenue and Imperial street on Sunday and swept through the bush on hundreds of acres of government owned land before it was got under control by hundreds of men fighting the flames. At one time the flames were dangerously close to the Sacred Heart Convent and houses in the vicinity.

Driven by Gale

On Wednesday, after all danger from the fire was believed to have been over, a strong west wind swung up towards the evening, fanned the flames anew and carried them across the marshy ravine between Twenty-fifth and 21st avenues, Dunbar Heights. Once in the dry slashings and timber east of Crown street the fire rapidly made its way towards the homes of a large number of people in the blocks between Twenty-fifth and Twenty-first avenues and west of Bruce street to Highbury street.

The fire department was called about midnight and aided by scores of men put up a successful fight and by three o'clock Thursday morning had the flames in check. Many of the occupants of houses removed their belongings so certain did it appear that the fire would destroy their homes. Many of the homes in danger were saved solely through the valiant efforts of the volunteer workers.

Credit Due Firemen

Great credit is due Fire Chief Shannon and his men for the manner in which they handled the situation, and the effectiveness with which their efforts were directed.

Board of Trade Met In Regular Session

The Richmond and Point Grey board of trade held their regular meeting last Monday. No new business came before the meeting. A letter was received asking the endorsation of the

Reeve is Authorized To Attend Convention

Reeve Fletcher was authorized by the Point Grey council on Tuesday night to attend the annual convention of the Union of Canadian Municipalities at Kington, Ont., August 13 to 14.

CANADIAN RED CROSS SOCIETY, VANCOUVER BRANCH

The following letter sent to Mrs. Waddell, chairman of the Richmond Red Cross, speaks for itself.

Dear Mrs. Waddell:—

It is with much pleasure I acknowledge the generous box of Red Cross supplies received today from the Richmond Red Cross. The workers of your excellent branch are to be congratulated on the way they are finishing up their Red Cross work, and doing it in the same splendid and careful manner as formerly. I can truly say that all supplies from the Richmond Red Cross have been a pleasure to receive, both as regards making, bundling, and packing, and they have a record that stands very high for general efficiency.

I note also the splendid hospital work in Ward "G" being accomplished by the same generous-hearted people, and the pleasure with which the boys receive the visits your Committee pays to them, speaks volumes for the kindness you extend to the patients at all times.

May I draw your attention to Ward "W" where Maher is now confined, and and ask if you will kindly arrange to see him through the window as no visitor is admitted to the ward? He would enjoy a small dish of ice cream, I am sure, and perhaps, strawberries.

Please advise me how you find him, and with kindest and best wishes to you all in your splendid work, believe me,

Yours faithfully,
MARGARET MILLS,
Superintendent, R. C. H.

People of Pt. Grey In Historic Peace Celebration Today

Scores of Gaily Decorated Cars Convey Children and Adults Through Streets of Vancouver

An Attractive Float

Municipal Officials and Residents Join with Fellow Citizens of Greater Vancouver in Historic Event

It is expected that Point Grey will be worthily represented in the great peace parade in Vancouver today. The committees having the arrangements in hand have been working hard and it is expected that the people's co-operation on this historic occasion will be manifested today, in order that Point Grey's showing may be worthy of the municipality and the occasion. It is hoped that all owners of automobiles will have them at the municipal hall, Kerrisdale by 9 o'clock this morning so that they will be available to convey the children of the municipality. All cars will be appropriately decorated it is expected.

Attractive Float.

The float for which the council appropriated $100 will be a most attractive one. Municipal Engineer Greig to whom was entrusted the responsibility of designing and constructing a suitable float has completed his task. The float is in form of a globe with the map outline of the Allied and associated nations worked in flowers. Surmounting the globe is the form of a dove in the attitude of alighting. Surrounding the globe are children in costume representing the allied nations carrying flags and holding ribbons running from the land each represents.

Reeve Fletcher and members of the council, municipal officials and school trustees will head the Point Grey contingent in the parade.

JOHNSON—OLIVER

A pretty wedding was solemnized at St. Mark's church, Kitsilano, by Rev. Canon Troop, on Saturday morning,

Secure Two Dwelling Houses as Temporary Bathing Headquarters

Accommodation for West Point Grey Bathers will be Provided West of Imperial Street

Minister's Telegram

Hon. T. D. Patullo Withholds Consent to Temporary Building on Beach Opposite Jericho Country Club

"Regret not in position to authorize temporary bathing house at Jericho beach. There are some complications regarding lease to Jericho Club which should be settled in any event. Think you should carry out permanent improvements on land leased by your municipality from government in accordance with understanding."

The receipt of a telegram worded as above from Hon. T. D. Patullo, minister of lands, by the Point Grey council the first of the week knocked into the dim and distant future all hope of having either a temporary or permanent bath house erected on the beach opposite the Jericho Country Club. It had been expected that the minister would grant permission to the council to build a temporary bath house, and for this expected permission the council waited for some weeks

Council Takes Action.

The matter came up before council on Tuesday night when after a somewhat protracted discussion and many suggestions as to the location of temporary bathing house quarters, it was decided [illegible] Councillor Arnold to lease from W. Simpson two dwelling houses on the west side of Imperial street for the remainder of the season, and to convert them into bathing houses.

Safest Beach

Considered Bylaws Dealing With The Tax Rate and Tax Sale Lands

New Rector to Preach First Sermon August 3

The new rector of St. Mary's church Kerrisdale, Rev. S. C. McGaffin will arrive from the east toward the end of the month and will assume his new duties almost immediately. While the exact date of Mr. McGaffin's arrival was not known at the time of going to press, it is known that he will conduct the services and preach his first sermon as rector of St. Mary's on Sunday, August 3, announcement to that effect having been made on Sunday last.

INTERNED ENEMY DIES; SUSTAINED INJURIES IN FIGHT

Deceased, Leo. Mueller, Formerly Operated Hair Dressing Establishment Here.

VERNON, B.C., July 12.—Leo. Mueller, an interned German prisoner, died this morning in the Vernon Jubilee hospital as the result of injuries received in a fight with another prisoner named Carl Wagner which took place at the internment camp on Tuesday evening. Before death Mueller signed a deposition exonerating Wagner, stating that he had butted him in the stomach. The force of the blow broke one of the vertebrae in Mueller's spinal column causing paralysis.

A coroner's jury brought in the following verdict: "We find that Leo. Mueller came to his death as the result of a broken neck received in a brawl with Carl Wagner, in an internment camp, July 8 at the internment camp and further we consider the military authorities should have notified the civil authorities."

Mueller conducted a hair dressing establishment in Vancouver before the

At Tuesday night's meeting, the Point Grey council gave preliminary readings to the Real Property Tax By-law. The municipal fathers also passed bylaws sanctioning the sale of certain tax sale property.

The real Property Tax by law sets forth the tax rate for the current year as follows: Shaughnessy Heights, 30 mills; on improved lands elsewhere other than Shaughnessy Heights, 18 mills and on "wild" lands, 33 mills. The bylaw states that a levy of 18.83 mills is necessary to provide $333,845.31 for sinking fund and interest. On outstanding loans of the municipality; for maintenance of schools and for an extension to Magee school a levy of 5 mills is required to provide $87,076.41 to provide $133,804.33 for general revenue and improvements in Shaughnessy Heights, 8.32 mills on Shaughnessy lands, 6.32 mills on improved lands and 16.33 on "wild" land.

On and after November first, 15 per cent will be added to the current year's taxes not then paid.

Tax Sale Property.

The policy of the council in regard to the disposal of the tax sale property, now owned by the municipality, was discussed by the finance committee, and it was unanimously decided that in all cases where the original owner had relinquished the privilege of purchasing their former property, Point Grey returned soldiers should be given an opportunity of purchasing the property. It was further decided that a list of available property be supplied to the joint housing committee, and that the committee submit recommendations to the council.

Chairman Sykes of the housing committee stated that seventeen applications had been received from soldiers for lots near schools and it was expected that before the next meeting applications would be in from eight or ten others.

To Pay Interest and Sinking Fund Account

The Point Grey Council at Tuesday

APPENDIX 3

SPECIES OCCURRING WITHIN EACH VEGETATION ASSOCIATION

Appendix 3 is a summary of plant species found within the vegetation associations of the Endowment Lands.

Table iv has been produced through the "VTAB" program and lists all species occurring in associations two through thirteen. For each species, occurrence is expressed by two digits. The Roman numeral refers to presence class (Table ii), how often the particular species occurs in the association. The second digit, from zero to nine, is the cover-abundance (Table iii). Cover-abundance is the mean cover class for the given species in that strata and association.

TABLE i: VEGETATION STRATA DESCRIPTION
(Wamsley et al., 1980)

Strata		Description
A (Tree) Layer	A1	- Dominant trees in the uppermost layer of the forest canopy.
	A2	- Codominant or intermediate trees.
	A3	- Suppressed trees over 3 metres in height.
B (Shrub) Layer	B1	- Tall shrubs - woody plants greater than 2 metres but less than 5 metres in height.
	B2	- Low shrubs - woody plants greater than 15 centimetres but less than 2 metres in height.
C (Herb) Layer	C	- Small woody plants less than 15 centimetres tall and all herbaceous plants.
D Layer	D	- Bryophytes, lichens, and seedlings growing on humus.

TABLE ii: PRESENCE CLASSES AND DESCRIPTION
(Wamsley et al., 1980)

Presence Class	Description (Percentage of plots in which species occur)
I	1-20
II	21-40
III	41-60
IV	61-80
V	81-100

TABLE iii: DOMIN-KRAJINA COVER-ABUNDANCE SCALE
(Wamsley et al., 1980)

Code	Abundance Description	Cover Values (%)
9	Any number of individuals, dominance over 3/4 of plot	>75
8	Any number of individuals, dominance 1/2 to 3/4 of plot	50-75
7	Any number of individuals, dominance 1/3 to 1/2 of plot	33-50
6	Any number of individuals, dominance 1/4 to 1/3 of plot	25-33
5	Often present, dominance 1/10 to 1/4 of plot	10-25
4	Often present, dominance 1/20 to 1/10 of plot	5-10
3	Scattered to plentiful, dominance less than 1/20 of plot	1-5
2	Very scattered, dominance small	1
1	Very sparsely present, dominance very small	<1

DIFFERENTIATED VEGETATION SUMMARY — UEL-VEGETATION — Table iv — 12:07 P M MAY 02, 1984 — PAGE 1

Coastal Douglas-fir / Wet Association	CDF/ b / 2	CDF/ b / 3	CDF/ b / 4	CDF/ b / 5	CDF/ b / 6	CDF/ b / 7	CDF/ b / 8	CDF/ b / 9	CDF/ b / 10	CDF/ b / 11
Total Releve Plots	15	10	7	6	12	14	6	17	9	9
ST SPECIES	PRESENCE CLASS AND MEAN SIGNIFICANCE									
A1										
Salix sp	I 1.2									
Abies grandis			I 1.3							
Acer circinatum				I +.8						
Betula papyrifera				I 1.4						
Populus balsamifera trichocarpa	II 2.4	I 1.6								
Prunus emarginata			I 1.3	I 1.4						
Acer macrophyllum			I 3.1		I 1.4					
Picea sitchensis										
Alnus rubra	I +.0				I 1.4	I 4.2				
Thuja plicata				II 2.4	I 1.9				II 2.2	II 2.9
Tsuga heterophylla				I 1.4	I 2.4	I 1.7		I +.5	IV 4.5	II 2.2
Pseudotsuga menziesii		I 3.8	II 2.0		III 3.6	II 2.3	V 5.0	V 4.4	I 1.1	II 3.0
A2										
Salix sp		III 4.8								
Acer glabrum douglasii			I 2.0							
Sorbus aucuparia				IV 5.4						
Malus fusca						I 1.3				
Abies grandis										
Rhamnus purshianus				II 4.5		I 2.2				
Populus balsamifera trichocarpa	II 3.6	I +.0		I 1.4						
Betula papyrifera	I 1.2	II 2.2		II 2.7						I 1.7
Picea sitchensis					I 1.0				I 1.1	
Acer macrophyllum		I 1.6	V 5.5	I 1.4		II 2.8			II 1.7	II 3.2
Prunus emarginata	II 3.1	V 8.0	II 4.0	III 3.2	I 1.4	II 3.2		I +.5		I 1.4
Pseudotsuga menziesii					I 2.3	I 1.7	V 8.4	V 7.9	II 4.1	II 2.5
Tsuga heterophylla					II 3.5	III 3.0	I 1.4	V 4.8	V 7.2	III 4.2
Alnus rubra	V 9.1	V 6.3	V 7.7	IV 5.4	V 8.0	V 8.0		II 3.3	II 2.2	II 2.5
Thuja plicata	I +.0		I 2.0	II 2.7	II 3.0	II 4.2		I 2.3	III 4.7	V 7.8
A3										
Acer glabrum douglasii	I +.7									
Acer circinatum				II 3.3						
Abies grandis						I 1.3				
Picea sitchensis										
Cornus nuttallii		I 1.6			I 1.0	I +.8				
Salix sp	I 1.2	I 1.0						I +.5		
Rhamnus purshianus			I 1.3	II 3.4		I +.8				
Sorbus aucuparia		I +.0		II 3.1		I +.8				
Betula papyrifera	I 1.0	I 1.0		I 1.4	I 1.4	I +.8				
Pseudotsuga menziesii			I 1.3		III 3.1	I 1.3	V 4.4	IV 4.3		
Acer macrophyllum	I +.7	I 3.8	IV 4.0	I 1.4				I 2.9	II 4.0	I 1.1
Prunus emarginata	I +.0	II 3.8	II 2.9		I 1.2	II 1.6	I +.0	I +.7	I +.0	
Tsuga heterophylla			I 1.3	I 2.2	II 2.4	III 3.2	II 2.1	III 3.2	IV 4.0	II 1.7
Thuja plicata		I +.3	II 2.0	I 1.4	II 2.4	IV 4.0	V 4.2	IV 3.9	III 3.1	V 4.8
Alnus rubra	I 4.6	II 3.0	II 2.0	II 2.1	II 4.9	III 4.8	I +.8	II 2.7	III 4.4	II 3.3
B1										
Symphoricarpos sp		I 2.9								
Rubus parviflorus			I 4.1							
Picea sitchensis				I 1.4						
Quercus garryana				I 1.4						
Acer glabrum douglasii			I 1.3		I +.1					

TABLE iv: SPECIES OCCURRING WITHIN EACH ASSOCIATION

Coastal Douglas-fir / Wet Association Total Releve Plots	CDF/ b / 12 6	CDF/ b / 13 12
ST SPECIES	PRESENCE CLASS AND MEAN SIGNIFICANCE	
A1		
Salix sp		
Abies grandis		
Acer circinatum		
Betula papyrifera		
Populus balsamifera trichocarpa		
Prunus emarginata		
Acer macrophyllum		
Picea sitchensis	I + 8	III 3.0
Alnus rubra		
Thuja plicata		
Tsuga heterophylla	I 2.2	I 2.9
Pseudotsuga menziesii	V 5.4	III 3.7
A2		
Salix sp		
Acer glabrum douglasii		
Sorbus aucuparia		
Malus fusca		
Abies grandis	I 3.2	
Rhamnus purshianus		
Populus balsamifera trichocarpa		
Betula papyrifera		
Picea sitchensis	II 2.7	III 4.8
Acer macrophyllum		I 2.6
Prunus emarginata		
Pseudotsuga menziesii	V 5.0	I 1.2
Tsuga heterophylla	V 5.3	V 5.2
Alnus rubra	I 3.2	
Thuja plicata	III 3.9	V 5.6
A3		
Acer glabrum douglasii		
Acer circinatum		
Abies grandis	I 1.4	
Picea sitchensis	I + 8	I 1.4
Cornus nuttallii		
Salix sp		
Rhamnus purshianus		
Sorbus aucuparia		I 1.2
Betula papyrifera		
Pseudotsuga menziesii	III 2.6	
Acer macrophyllum	III 2.6	I 1.4
Prunus emarginata		I 1.0
Tsuga heterophylla	V 3.7	V 4.3
Thuja plicata	IV 5.0	V 5.1
Alnus rubra	I 2.2	III 3.9
B1		
Symphoricarpos sp		
Rubus parviflorus		
Picea sitchensis		
Quercus garryana		
Acer glabrum douglasii		

Coastal Douglas-fir / Wet Association Total Releve Plots	CDF/ b / 2 15	CDF/ b / 3 10	CDF/ b / 4 7	CDF/ b / 5 6	CDF/ b / 6 12	CDF/ b / 7 14	CDF/ b / 8 6	CDF/ b / 9 17	CDF/ b / 10 9	CDF/ b / 11 9
ST SPECIES	PRESENCE CLASS AND MEAN SIGNIFICANCE									
B1										
Gaultheria shallon							I 1.4	I +.5		
Pseudotsuga menziesii		I +.3	I 1.3			I 1.7				
Malus fusca			I 1.3	II 3.4		I +.8				
Rosaceae			I +.6		I +.1					
Menziesia ferruginea				II 2.7						I 1.1
Taxus brevifolia					I +.1				I 1.1	
Acer macrophyllum	I 1.0	II 3.5	III 2.2							
Prunus emarginata	I +.0	I 1.3	I 1.3	I 1.4	I +.1					
Cornus nuttallii	I 1.2	I 2.9			II 2.4	III 2.4			I +.4	
Ilex aquifolium					I 1.2	I 1.3	II 1.8	II 1.9		I 1.1
Rhamnus purshianus	I 1.4	I +.3	III 2.3	IV 5.3		I 1.7	I +.8			I +.4
Alnus rubra		I +.3	I 1.3	I 1.4	I 1.9	I +.8		I +.5		
Tsuga heterophylla		I 1.3		V 3.4	III 4.0	III 3.0	IV 3.9	IV 3.1	IV 4.5	III 3.0
Acer circinatum	I 2.2	I +.3		IV 5.6	V 7.7	I 1.3	I +.8	II 4.7	III 5.3	II 4.1
Sambucus racemosa	IV 5.3	III 5.2	IV 5.8		IV 5.3	IV 5.1	II 2.1	I 2.8	II 3.8	III 3.9
Thuja plicata		I 3.1	IV 3.4	V 3.7	III 3.1	V 4.4	III 3.0	III 4.1	II 2.9	IV 4.8
Rubus spectabilis	III 6.2	II 4.0	V 6.7	III 5.5	II 3.8	III 4.9	I 2.2	II 3.0	II 2.3	III 4.2
Sorbus aucuparia	II 1.5	III 2.3	III 3.6	V 5.1	III 3.2	III 2.9	III 1.5	II 1.9	I +.4	III 2.5
Vaccinium parvifolium	I 2.7	II 3.3	II 1.6	III 4.0	III 2.9	IV 5.1	III 4.2	III 2.8	II 3.5	III 2.3
B2										
Alnus rubra		I +.0								
Polystichum munitum		I 3.9								
Pseudotsuga menziesii		I +.0								
Rhododendron sp		I +.1								
Betula papyrifera				I +.8						
Amelanchier alnifolia						I +.8				
Malus fusca						I +.8				
Claytonia perfoliata								I +.0		
Salix sp								I +.0		
Abies grandis										
Acer macrophyllum		II 1.4	II 1.0							
Spiraea douglasii		I 1.6		I 2.2						
Kalmia sp		I +.0			I +.0					
Symphoricarpos sp		I 2.6				I +.8				
Pteridium aquilinum		II 4.0						I 1.2		
Picea sitchensis				I +.0						
Acer glabrum douglasii		I +.0	I 3.1					I +.0		
Cornus nuttallii		I 1.0							II +.7	
Menziesia ferruginea				III 2.4			II 1.8			
Rubus parviflorus	I 1.0	III 3.6					I +.0	I +.0		
Rubus ursinus	I 3.2	III 5.9				I 3.2		I +.5		
Ribes bracteosum									II 1.7	I 1.1
Rosaceae	I +.0	I 1.3	I 1.3		I +.8	II 1.4	I +.8	I 1.0		I +.4
Sambucus racemosa		II 1.7	I 1.3		III 2.1	II 2.5	I +.0	I 1.6	I 1.1	
Rhamnus purshianus		II +.4		IV 3.3	II 1.2	III 1.8	IV 1.6	III 1.5	II +.7	II 1.9
Acer circinatum	I +.0	I +.0		III 3.9	III 4.1	I +.8	I +.8	I 1.8	III 4.7	III 3.3
Ilex aquifolium	III 3.4	II 2.1		I +.0	IV 3.7	III 3.0	V 3.1	IV 4.0	IV 3.3	IV 3.8
Mahonia nervosa	I 1.0	III 4.5	II 2.5	I 1.4	III 3.5	II 2.4	III 4.5	II 2.1	II 2.6	
Sorbus aucuparia	I 1.4	III 1.6		II 2.7	II 1.8	III 2.1	III 1.5	I +.1	I +.4	II 1.4
Tsuga heterophylla		I +.3	I 1.3	V 3.0	III 2.4	I 3.3	V 5.3	V 4.6	IV 2.8	V 3.0

Coastal Douglas-fir / Wet	CDF/ b / 12	CDF/ b / 13
Association		
Total Releve Plots	6	12
ST SPECIES	PRESENCE CLASS AND MEAN SIGNIFICANCE	
B1		
Gaultheria shallon		
Pseudotsuga menziesii		
Malus fusca		
Rosaceae		I 1.0
Menziesia ferruginea		I 1.0
Taxus brevifolia	I 1.4	
Acer macrophyllum		I 1.0
Prunus emarginata		
Cornus nuttallii		
Ilex aquifolium		II 1.6
Rhamnus purshianus		III 2.1
Alnus rubra	I 1.4	I +.1
Tsuga heterophylla	V 6.1	IV 5.3
Acer circinatum	IV 5.8	III 5.8
Sambucus racemosa	III 3.9	II 1.6
Thuja plicata	II 4.5	IV 4.1
Rubus spectabilis	IV 3.7	III 3.5
Sorbus aucuparia	II 2.1	III 2.9
Vaccinium parvifolium	III 2.6	III 4.0
B2		
Alnus rubra		
Polystichum munitum		
Pseudotsuga menziesii		
Rhododendron sp		
Betula papyrifera		
Amelanchier alnifolia		
Malus fusca		
Claytonia perfoliata		
Salix sp		
Abies grandis		I +.1
Acer macrophyllum		
Spiraea douglasii		
Kalmia sp		
Symphoricarpos sp		
Pteridium aquilinum		
Picea sitchensis		I +.1
Acer glabrum douglasii		
Cornus nuttallii	I +.0	
Menziesia ferruginea		I 1.0
Rubus parviflorus		
Rubus ursinus		
Ribes bracteosum	I 1.4	I 1.9
Rosaceae		
Sambucus racemosa	I 1.4	I +.0
Rhamnus purshianus	I +.0	III 2.1
Acer circinatum	II 2.4	II 3.9
Ilex aquifolium	V 2.4	III 2.5
Mahonia nervosa	II 1.8	I +.0
Sorbus aucuparia	I +.8	III 2.2
Tsuga heterophylla	V 5.1	V 3.7

Coastal Douglas -fir / Wet Association Total Releve Plots	CDF/ b / 2 15	CDF/ b / 3 10	CDF/ b / 4 7	CDF/ b / 5 6	CDF/ b / 6 12	CDF/ b / 7 14	CDF/ b / 8 6	CDF/ b / 9 17	CDF/ b / 10 9	CDF/ b / 11 9
ST SPECIES	PRESENCE CLASS AND MEAN SIGNIFICANCE									
B2										
Gaultheria shallon	III 3.2	IV 5.8	II 2.5	V 7.6	IV 3.4	V 5.9	V 6.4	V 7.2	V 5.0	V 5.5
Rubus spectabilis	IV 7.6	IV 5.1	II 4.4	III 5.7	IV 5.1	IV 5.3	III 3.0	IV 4.2	III 2.6	IV 3.7
Thuja plicata	I 1.2	I 3.3	III 2.4	IV 2.6	III 3.3	V 4.1	III 4.3	V 4.0	III 3.2	V 5.0
Vaccinium parvifolium	I 1.7	IV 3.6	I 1.3	III 3.3	V 3.1	IV 3.5	V 5.3	V 5.2	V 3.9	IV 3.1
C										
Dicentra formosa		I +.0								
Galium sp		I +.0								
Petasites sp		I 1.0								
Sambucus racemosa					I +.1					
Quercus garryana								I +.0		
Viola sp								I +.7		
Calypogeja trichomanis										I +.0
Hylocomium splendens										I +.0
Mnium glabrescens										I 1.1
Plagiothecium undulatum										I 1.7
Stokesiella oregana										I +.4
Stokesiella praelonga										I 1.7
Geum macrophyllum		I 3.1	I 2.0							
Mahonia nervosa	I +.0							I +.0		
Taxus brevifolia		I +.6				I +.0				
Cryptogramma sp		I +.0								II +.7
Equisetum sp	I +.7									
Polystichum sp							I 1.4	I 3.1		
Malanthemum dilatatum		I +.0			I 1.4	I +.8				
Vaccinium parvifolium	I +.2					I +.0			I +.4	
Rhamnus purshianus				I +.8						I +.4
Cornus canadensis				I +.0			II 1.5			
Thuja plicata				I +.8	I +.1				I +.4	I +.4
Tsuga heterophylla	I +.0			I +.8				I +.0	I 1.1	II 1.4
Lysichiton americanum				III 2.1	I +.1		I +.8	I +.5		II 1.4
Tiarella trifoliata	I +.7				II 1.2	I +.0	I +.8	I +.0	I +.0	
Athyrium filix-femina	I +.7			I 1.4		I +.8	I 1.4	I 2.2		II 3.2
Ilex aquifolium	I +.7				I +.4	I +.0	I 1.4		I +.4	I +.4
Poaceae	I 1.2	II 2.2	II +.4	I 1.4	I +.0		I +.8			
Polypodium sp	I +.0		III 1.9	II 1.1	II +.7	I +.0		I +.7	II 1.0	II 1.3
Blechnum spicant	II 2.5		I 1.3	V 5.0	III 2.2	II 1.8	III 3.5	III 2.3	III 2.8	V 3.2
Dryopteris assimilis	IV 5.1	II 5.0	V 7.0	V 6.1	V 6.7	V 5.5	V 4.9	V 5.3	V 5.5	V 6.6
Polystichum munitum	IV 4.4	IV 5.1	V 5.0	IV 3.7	V 5.3	V 4.3	III 4.2	III 3.4	V 5.0	IV 4.8
Pteridium aquilinum	III 3.6	III 3.7	V 4.0	II 3.7	I 2.3	IV 4.5	V 5.6	IV 4.9	III 5.0	II 2.9
Rubus ursinus	III 6.0	IV 7.5	IV 7.1	IV 5.1	IV 4.0	V 6.5	V 4.1	IV 5.2	III 2.5	IV 4.7
DH										
Hypnum circinale	I +.7									
Isothecium sp	I 2.1									
Polytrichum juniperinum		I 1.6								
Polystichum sp		I 1.0								
Plagiothecium laetum							I 1.4			
Cornus canadensis								I 2.0		
Gaultheria shallon								I 4.1		
Lepidozia sp								I 2.0		
Thuja plicata								I 2.0		

Coastal Douglas-fir / Wet Association	CDF/ b / 12	CDF/ b / 13
Total Releve Plots	6	12
ST SPECIES	PRESENCE CLASS AND MEAN SIGNIFICANCE	
B2		
Gaultheria shallon	V 5.1	V 5.5
Rubus spectabilis	III 2.1	V 4.8
Thuja plicata	V 4.5	V 4.0
Vaccinium parvifolium	V 2.7	IV 4.2
C		
Dicentra formosa		
Galium sp		
Petasites sp		
Sambucus racemosa		
Quercus garryana		
Viola sp		
Calypogeja trichomanis		
Hylocomium splendens		
Mnium glabrescens		
Plagiothecium undulatum		
Stokesiella oregana		
Stokesiella praelonga		
Geum macrophyllum		
Mahonia nervosa		
Taxus brevifolia		
Cryptogramma sp		
Equisetum sp		I +.0
Polystichum sp		
Maianthemum dilatatum		
Vaccinium parvifolium		
Rhamnus purshianus		I +.8
Cornus canadensis	I +.0	I 1.2
Thuja plicata		I +.0
Tsuga heterophylla		I +.4
Lysichiton americanum		III 3.0
Tiarella trifoliata		I +.0
Athyrium filix-femina	I 3.9	II 2.4
Ilex aquifolium	I +.0	II +.7
Poaceae	I +.0	I 1.0
Polypodium sp	II 1.5	I +.0
Blechnum spicant	V 3.7	V 3.9
Dryopteris assimilis	V 4.8	V 5.2
Polystichum munitum	V 5.1	V 5.0
Pteridium aquilinum	I +.0	II 2.1
Rubus ursinus	IV 2.2	III 2.0
DH		
Hypnum circinale		
Isothecium sp		
Polytrichum juniperinum		
Polystichum sp		
Plagiothecium laetum		
Cornus canadensis		
Gaultheria shallon		
Lepidozia sp		
Thuja plicata		

Coastal Douglas-fir / Wet Association	CDF/ b / 2	CDF/ b / 3	CDF/ b / 4	CDF/ b / 5	CDF/ b / 6	CDF/ b / 7	CDF/ b / 8	CDF/ b / 9	CDF/ b / 10	CDF/ b / 11
Total Releve Plots	15	10	7	6	12	14	6	17	9	9
ST SPECIES	PRESENCE CLASS AND MEAN SIGNIFICANCE									
DH										
Vaccinium parvifolium								I 4.2		I 1.7
Lophocolea cuspidata										
Plagiochila porelloides										
Scapania bolanderi								I +.0		
Pseudotsuga menziesii		I +.0								
Brachythecium sp		I +.3							I +.0	
Leucolepis menziesii				II 1.1				I +.1		
Pogonatum contortum		I 1.0		I +.8			I 3.2	I +.0		I +.0
Isopterygium elegans				II 1.5						I 1.7
Sphagnum sp								I 2.0		I 1.1
Calypogeja trichomanis								I 1.2		I +.0
Tsuga heterophylla				I +.0				II 3.1	II 2.9	
Dicranum sp		I 2.1		I +.0		I 2.2		I 2.0	II 3.2	
Mnium insigne				III 1.0			II +.5	II 3.0	II 4.9	II 3.0
Hylocomium splendens	I 1.2	I 1.6		II 1.1		II 3.5	I +.0	II 2.2	II 3.9	II 3.0
Rhytidiadelphus loreus		II 3.0	I 1.3	I +.8	I 3.5		V 4.0	III 3.1	IV 4.1	II 1.8
Stokesiella oregana	I 1.6	I 1.6		IV 2.2	II 3.7	II 3.1	III 4.5	IV 5.0	V 5.7	IV 5.6
Mnium glabrescens	I 1.2	I 1.0		II +.5	III 3.8	II 3.5	V 3.7	V 5.2	IV 5.1	V 5.0
Plagiothecium undulatum	I 4.1	II 4.2		IV 2.9	I 1.6	II 3.9	III 4.5	IV 5.2	IV 4.5	IV 5.2
Stokesiella praelonga										
DW										
Hylocomium splendens						I 2.2				
Hypnum circinale						I 2.2				
Lepidozia sp						I 2.2				
Mnium glabrescens						I 2.2				
Plagiothecium undulatum						I 2.2				
Rhytidiadelphus loreus						I 2.2				
Scapania bolanderi						I 2.2				
Stokesiella oregana						I 2.2				
Stokesiella praelonga						I 2.2				

Coastal Douglas-fir / Wet Association	CDF/ b / 12	CDF/ b / 13
Total Releve Plots	6	12
ST SPECIES	PRESENCE CLASS AND MEAN SIGNIFICANCE	
DH		
Vaccinium parvifolium		
Lophocolea cuspidata		
Plagiochila porelloides	I +.0	
Scapania bolanderi		I +.0
Pseudotsuga menziesii		
Brachythecium sp		I +.0
Leucolepis menziesii		I +.0
Pogonatum contortum		
Isopterygium elegans		
Sphagnum sp		I +.1
Calypogeja trichomanis	I +.0	
Tsuga heterophylla		I +.0
Dicranum sp	II +.5	III 2.6
Mnium insigne	I +.8	I +.0
Hylocomium splendens	III 1.7	III 1.5
Rhytidiadelphus loreus	II 1.1	I +.4
Stokesiella oregana	III 2.1	II 2.9
Mnium glabrescens	IV 4.4	V 4.4
Plagiothecium undulatum	V 5.1	V 4.4
Stokesiella praelonga	V 5.5	V 4.4
DW		
Hylocomium splendens		
Hypnum circinale		
Lepidozia sp		
Mnium glabrescens		
Plagiothecium undulatum		
Rhytidiadelphus loreus		
Scapania bolanderi		
Stokesiella oregana		
Stokesiella praelonga		

APPENDIX 4

SOILS: HUMUS FORM AND MOISTURE REGIME

TABLE i: HUMUS FORM
(Wamsley et al., 1980)

Form	Description
Mull	LFH horizons very thin <2 cm. Organic matter intermixed in upper mineral soil (Ah).
Moder	F horizon loose, not matted; insects common.
Mor	F horizon matted; fungal mycelia common.
Histomull	Organic material well decomposed (black, greasy).
Histomoder	Organic material partly decomposed.
Histomor	Organic material poorly decomposed.

TABLE ii: MOISTURE REGIME CLASSES
(Wamsley et al., 1980)

Moisture Regime	Description
Very Xeric	Water removed very rapidly; soil is moist for a negligible time after precipitation.
Xeric	Water removed very rapidly; soil is moist for a brief time after precipitation.
Subxeric	Water removed rapidly; soil is moist for short periods following precipitation.
Submesic	Water removed readily; water available for moderately short periods following precipitation.
Mesic	Water removed slowly; soil may remain moist for short periods of the year.
Subhygric	Water removed slowly enough to keep the soil wet for part of the growing season.
Hygric	Water removed slowly enough to keep the soil wet for most of the growing season.
Subhydric	Water removed slowly enough to keep the water table at or near the surface for most of the year.
Hydric	Water removed so slowly that the water table is at or above the soil surface all year.

APPENDIX 5

SITE DIAGNOSIS: EDATOPIC INDICATOR SPECIES

Introduction

Site diagnosis is a procedure for determining site quality. Diagnosis is based upon selected soil properties and identification of site indicator species. By understanding the ecological requirements of each indicator plant species the sites themselves are more easily understood.

Edatopic Grid

Biogeoclimatic zones have been developed to identify areas of similar climatic potential. Based upon climate each zone will tend toward a potential climax ecosystem. The Endowment Lands fall within the wet subzone (w) of the Coastal Douglas-fir zone (CDF).

The edatopic grid is a method of relating vegetation to soil moisture and nutrient regime within a biogeoclimatic zone. A total of eighteen edatopic indicator species groups (EISGs) have been developed to facilitate forest site diagnosis in the Vancouver Forest Region. The groups include plant species that have similar ecological requirements. Each group is identified by a two-digit reference code. The first digit indicates the range of nutrient regime (trophotope) as following:

1) nutrient-very poor to poor;
2) nutrient-medium;
3) nutrient-rich to very rich.

The second digit indicates the range of actual moisture regime (hygrotope) as follows:

0) extremely dry;
1) very dry;
2) very dry to dry;
3) dry to fresh;
4) dry to moist;
5) fresh to moist;
6) moist to wet;
7) wet.

Table i describes the characteristics of each EISG in the Vancouver Region.

Based upon: Klinka, K. et al. 1984. Site Diagnosis, Tree Species Selection, and Slashburning Guidelines for the Vancouver Forest Region. B.C. Ministry of Forests. 180 p.

TABLE 1: EDATOPIC INDICATOR SPECIES GROUPS

1. Nutrient-very poor to medium sites

EISG No. 1.1: Very dry, nutrient-very poor to poor sites
EISG No. 1.2: Very dry to dry, nutrient-very poor to medium sites
EISG No. 1.3: Dry to fresh, nutrient-very poor to medium sites
EISG No. 1.4: Dry to moist, nutrient-very poor to medium sites
EISG No. 1.5: Fresh to moist, nutrient-very poor to medium sites
EISG No. 1.6: Moist to wet, nutrient-very poor to medium sites
EISG No. 1.7: Wet, nutrient-very poor to medium sites

2. Nutrient-medium sites

EISG No. 2.1: Very dry to dry, nutrient-(poor to) medium sites
EISG No. 2.2: Dry to fresh, nutrient-medium sites
EISG No. 2.3: Dry to moist, nutrient-medium sites
EISG No. 2.4: Fresh to moist, nutrient-medium sites

3. Nutrient-medium to very rich sites

EISG No. 3.1: Very dry, nutrient-medium (to rich) sites
EISG No. 3.2: Very dry to dry, nutrient-medium to very rich sites
EISG No. 3.3: Dry to fresh, nutrient-medium to very rich sites
EISG No. 3.4: Dry to moist, nutrient-medium to very rich sites
EISG No. 3.5: Fresh to moist, nutrient-medium to very rich sites
EISG No. 3.6: Moist to wet, nutrient-medium to very rich sites
EISG No. 3.7: Wet, nutrient-medium to very rich sites

Table v is the edatopic grid which is pertinent to the Endowment Lands. The grid is subdivided into several site units outlined with bold lines. These site units represent groupings of closely related forest sites which can support forest stands of the same composition and structure. These represent potentially the best forest composition if the land unit is to be managed with the intent of a sustained forest harvest. This is not proposed for the Endowment Lands but the grouping does indicate which tree species would be most suited on the various sites.

Tables ii, iii, and iv provide legends to the symbols used in Table v. Representative members of each edatopic indicator species group are included in italics in Table v.

TABLE ii: TREE SPECIES

Symbol	Species
Ac	Black cottonwood
Bg	Grand fir
Cw	Western red cedar
Fd	Douglas-fir
Pl	Lodgepole pine

TABLE iii: TREE SPECIES COMPOSITION

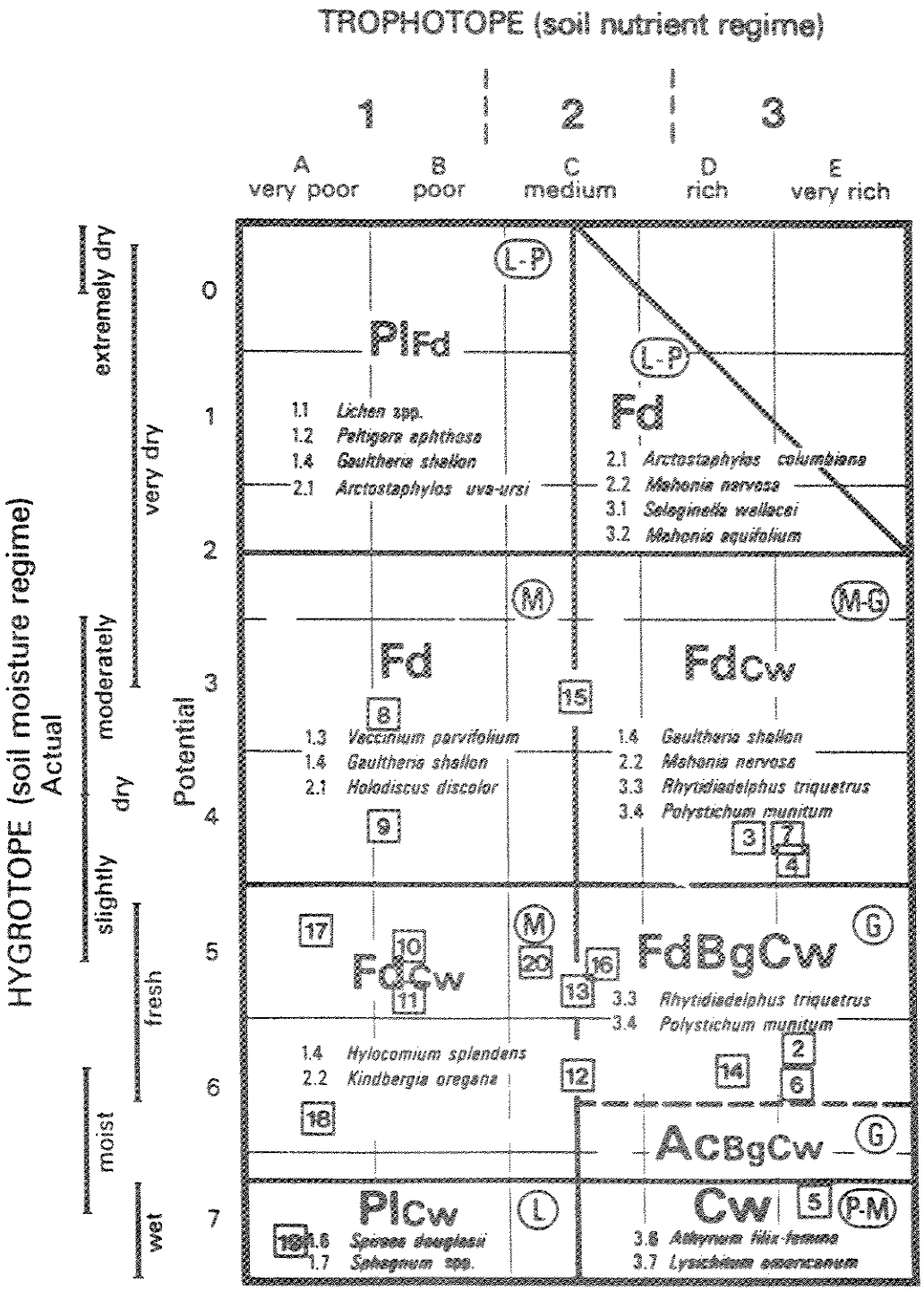
Roll of Species	Size of Symbol
Major crop species	Large
Minor crop species	Small

TABLE iv: GROWTH CLASS

Symbol	Class
G	Good
M	Medium
P	Poor
L	Low

Each of the twenty vegetation associations outlined in this report have been plotted within the grid in its approximate location. These locations are indicated on the grid by small squares inside which is the corresponding association number. Association one has been omitted. This association occurs over such a large variety of sites that it is not possible to assign it a EISG value. The EISG value for each association is based only upon the indicator species of the characteristic species list.

TABLE v: COASTAL DOUGLAS-FIR ZONE EDATOPIC GRID AND ENDOWMENT LANDS VEGETATION ASSOCIATIONS*
(Klinka, Green et al., 1984)



*Numbers in squares refer to Endowment Lands Vegetation Associations.

APPENDIX 6

PERMANENT PLOTS

In addition to the vegetation mapping study of the Endowment Lands, 29 of the releve plots have been permanently marked in the field in order to facilitate long term studies of plant succession.

The first set of plots permanently marked were centred around 16th Avenue and Salish Trail. Referred to as series "A", these are numbered A01 through A13, the numerical digits corresponding to their association number. Series "B" is a backup set of plots spread throughout the Endowment Lands. Series "C" is an incomplete set providing additional plots for the larger associations.

Initially each of the 29 plots was sampled at the same time and in the same manner as the other releve plots. A floristic listing for these permanent plots is incorporated into the general listings found in the separately published appendices. These plots have been further sampled to provide more detailed mensuration data. See "Sampling" in this appendix.

Methodology

As in the standard releve plots the permanent plots are 20m x 20m square. Except for plots A05 and B05 plot corners are due north, south, east, and west of plot centre. (In the case of plots A05 and B05 the entire plot has been rotated 90° counterclockwise to fit the plots within the boundaries of the association).

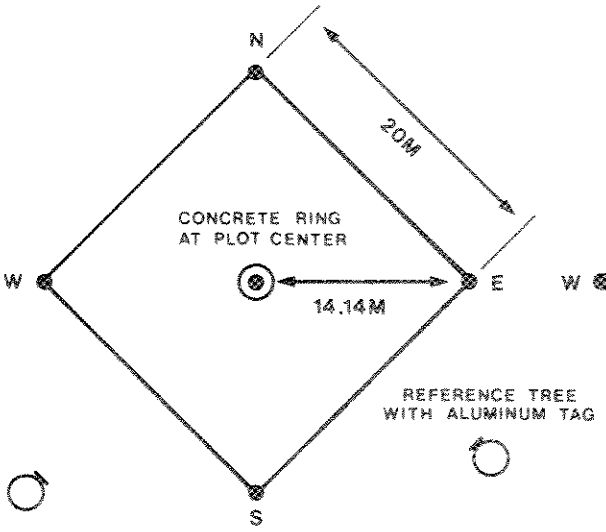
The plot centre is marked with a one metre section of one centimetre reinforcing bar. The reinforcing bar passes through and is raised above the centre of a poured concrete slab fifty centimetres in diameter. The letters "GVRD" and the plot number are inscribed into the concrete. Corners are also marked with reinforcing bars protruding ten centimetres above the ground surface. Corner posts are 14.14m from plot centre. Plot centres and corner posts are painted with a rust proof red paint.

To aid in relocating plot centres, two aluminum tags reference each plot. These tags have been placed at eye level on neighbouring trees with distance and bearing to the plot centre recorded on each.

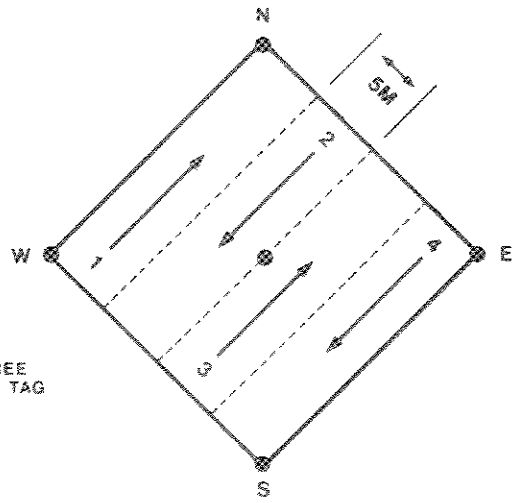
Each plot was subdivided into four rectangular sectors. First, string was run around the perimeter of each plot. Three more lines were then set at intervals of five metres joining the south-west and north-east sides. This procedure created four parallel sectors which should be used in re-establishing tree locations.

Sampling

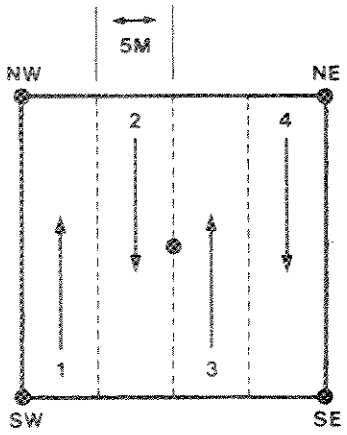
Plots were sampled beginning in sector one at the west corner of the plot, moving along the sector towards the north corner. Trees were identified and measured in order of interception as the sampler was moving along the sector. Sectors were sampled in alternating directions ending at the south corner of the plot in sector four. (For plots A05 and B05 the sectors run south to north. Sampling started at the south-west corner of the plot in sector one and ended at the south-east corner of the plot in sector four).



PERMANENT PLOT LAYOUT



PLOT SECTORS



PLOT SECTORS
FOR A05 AND B05

Tree species greater than 2.5 centimetres at breast height (dbh = 1.3m above germination point) had species, sector number, diameter, tree class, pathological remarks, and crown class recorded on the B.C. Forest Service "Growth Sample Record Sheet For Natural Stands" tally sheets.

Ten to fifteen trees were chosen as height trees for each plot. These were chosen on the basis of developing a height/diameter relationship for each plot. Height trees were mapped in relation to plot centre using azimuth bearing (0° to 360°) and distance. Five ages per plot were recorded for selected height trees using increment cores and the appropriate B.C. Forest Service age corrections.

Results

Twenty-nine permanent plots were established. Twenty-seven of these have been further studied for mensuration data. Two others, A01 and B01 do not at this time support tree species of 2.5 centimetres in diameter at breast height.

For these twenty-seven plots the following information is available:

i) Detailed floristic listings.

ii) Detailed soils analysis.

iii) Species, diameters, and pathological remarks for tree species greater than 2.5 cm dbh.

iv) 10-15 representative tree heights with mapping coordinates per plot.

v) 5 age measurements per plot.

Sections i and ii are available in a separately published data volume from GVRD Parks Department. The information from sections iii, iv, and v is on file at the GVRD Parks Department.

TABLE i: PERMANENT PLOT LOCATIONS

Plot		Location
A01	i)	From the entrance of Admiralty Trail to the Plains of Abraham,
	ii)	45 m @ 200° to plot centre.
A02	i)	From the junction of Chancellor Boulevard and University Hill School road,
	ii)	261 m east along median,
	iii)	49 m @ 03°,
	iv)	22 m at due north to plot centre.
A03	i)	From the junction of West Canyon Trail and the north edge of Chancellor Boulevard,
	ii)	518 m north along West Canyon Trail,
	iii)	88 m @ 240° to plot centre.
A04	i)	From the junction of Doncaster Avenue and the western edge of 29th Avenue,
	ii)	42 m west along Karmike Trail to the junction with Sasamat Trail,
	iii)	72 m south along Sasamat Trail,
	iv)	112 m @ 239° to plot centre.
A05	i)	From the junction of Imperial Trail and Imperial Road,
	ii)	235 m west along Imperial Trail to hydro pole #62,
	iii)	39 m due south from the hydro pole,
	iv)	38 m @ 171°,
	v)	28 m due south to plot centre.
A06	i)	From the junction of Vine Maple, Salal, and Newt Loop Trails,
	ii)	40 m southeast along Vine Maple Trail,
	iii)	12 m @ 60° to plot centre.
A07	i)	From the junction of Salish Trail and the bicycle path on the southern side of 16th Avenue,
	ii)	301 m east along the bicycle path,
	iii)	122 m due south to plot centre.

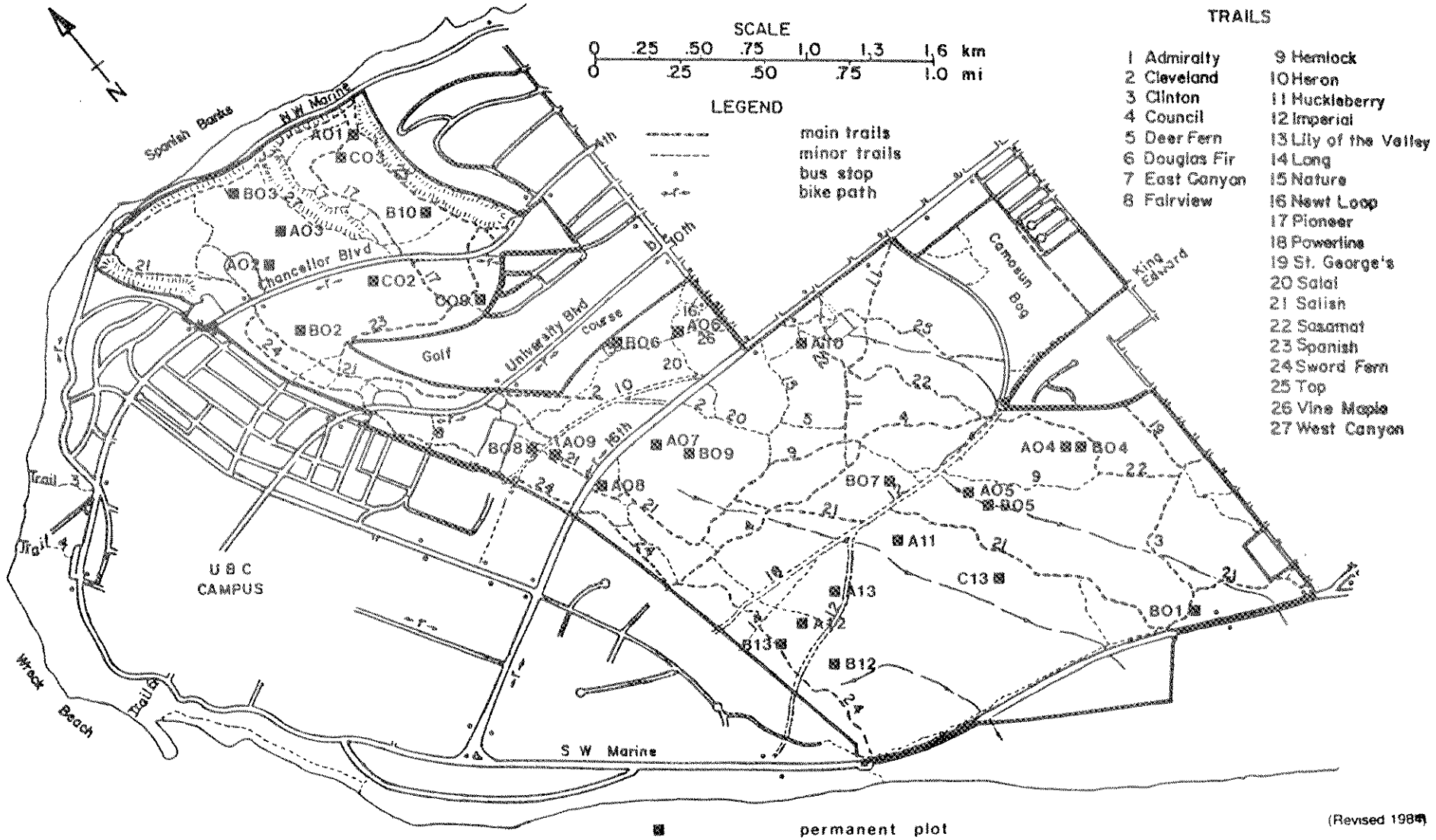
Plot		Location
A08	i)	From the junction of Salish Trail and the bicycle path on the south side of 16th Avenue,
	ii)	104 m south along Salish Trail,
	iii)	22 m due north to plot centre.
A09	i)	From the junction of Salish Trail and the bicycle path on the north side of 16th Avenue,
	ii)	115 m north along Salish Trail,
	iii)	16 m due west to plot centre.
A10	i)	From the junction of Top Trail and 16th Avenue across from Tolmie Street,
	ii)	73 m @ 158°,
	iii)	35 m @ 218°,
	iv)	27 m west along trail,
	v)	16 m due north to plot centre.
A11	i)	From the junction of Imperial Trail and Salish Trail south,
	ii)	126 m south along Salish Trail,
	iii)	106 m @ 240° to plot centre.
A12	i)	From the junction of Imperial Trail and Salish Trail north,
	ii)	45 m west along Imperial Trail,
	iii)	477 m south-west along Imperial Trail,
	iv)	51 m @ 347° along minor trail,
	v)	79 m due west to plot centre.
A13	i)	From the junction of Imperial Trail and Salish Trail north,
	ii)	45 m west along Imperial Trail,
	iii)	267 m south-west along Imperial Trail,
	iv)	43 m @ 307° to plot centre.
B01	i)	From the junction of Clinton Trail and the north edge of S.W. Marine Drive,
	ii)	127 m east along road edge to Vancouver City Monument #2992,
	iii)	34 m @ 03° to plot centre.

Plot		Location
B02	i)	From the junction of Salish Trail and the south edge of Chancellor Boulevard,
	ii)	371 m south along Salish Trail,
	iii)	32 m due east to plot centre.
B03	i)	From the junction of Admiralty Trail and West Canyon Trail,
	ii)	Then 262 m west along Admiralty Trail,
	iii)	Then 108 m due south to plot centre.
B04	i)	From the junction of Doncaster Avenue and the western edge of 29th Avenue,
	ii)	42 m west along Karmike Trail to the junction with Sasamat Trail,
	iii)	72 m south along Sasamat Trail,
	iv)	91 m @ 193° to plot centre.
B05	i)	From the junction of Imperial Trail and Imperial Road,
	ii)	236 m west along Imperial Trail to hydro pole #62,
	iii)	58 m @ 175° from the hydro pole to Sasamat Trail,
	iv)	27 m due south to an aluminum marker on a bigleaf maple,
	v)	168 m due south,
	vi)	30 m due west to plot centre.
		* One of the reference trees for this plot is a 52 cm diameter hemlock in the association.
B06	i)	From the junction of Cleveland Way Trail and Lily-of-the-Valley trail,
	ii)	138 m east along Lily-of-the-Valley Trail,
	iii)	22 m due north to plot centre.
B07	i)	From the junction of Imperial Trail and Imperial Road,
	ii)	687 m west along Imperial Trail,
	iii)	121 m due north to plot centre.
B08	i)	From the junction of Heron Trail and Cleveland Way Trail,
	ii)	190 m west along Heron Trail,
	iii)	33 m @ 350° to plot centre.

Plot		Location
B09	i)	From the junction of Salal Trail and the bicycle path on the southern side of 16th Avenue,
	ii)	90 m west along bicycle path,
	iii)	140 m south along minor trail,
	iv)	80 m west along secondary,
	v)	35 m @ 262° to plot centre.
B10	i)	From the junction of Spanish Trail and the north edge of Chancellor Boulevard,
	ii)	197 m north along Spanish Trail,
	iii)	37 m due west to plot centre.
B11		Not established.
B12	i)	From the junction of Imperial Trail and Salish Trail north,
	ii)	45 m west along Imperial Trail,
	iii)	600 m south-west along Imperial Trail,
	iv)	107 m @ 340°,
	v)	85 m due south to plot centre.
B13	i)	From the junction of Imperial Trail and Sword Fern Trail,
	ii)	170 m north along Sword Fern Trail,
	iii)	15 m east to plot centre.
C02	i)	From the junction of Pioneer Trail and the bicycle path along Chancellor Boulevard,
	ii)	270 m west along bicycle path,
	iii)	70 m due south to plot centre.
C03	i)	From plot centre of A01,
	ii)	84 m west along Pioneer Trail,
	iii)	29 m due north to plot centre.
C09	i)	From the junction of Tasmania Crescent and Meade Trail,
	ii)	54 m west along Meade Trail,
	iii)	20 m @ 40° to plot centre.

Plot		Location
C13	i)	From the junction of Clinton Trail and the edge of S.W. Marine Drive,
	ii)	93 m north along Clinton Trail to the junction with Salish Trail,
	iii)	774 m west along Salish Trail,
	iv)	25 m due west along unnamed minor trail,
	v)	70 m due west to plot centre.

UNIVERSITY ENDOWMENT LANDS TRAIL MAP SHOWING LOCATION OF PERMANENT PLOTS



(Revised 1984)

APPENDIX 7

FLORAL LISTS

Common names	Scientific names	EISG No.
	TREES	
Bigleaf maple	Acer macrophyllum	3.5
Bitter cherry	Prunus emarginata	3.4
Black cottonwood	Populus trichocarpa	3.5
Black hawthorn	Crataegus douglasii	3.6
Cascara	Rhamnus purshiana	3.6
Douglas-fir	Pseudotsuga menziesii	
Grand fir	Abies grandis	
Mountain ash	Sorbus aucuparia	
Pacific crabapple	Malus fusca	3.7
Pacific dogwood	Cornus nuttallii	3.3
Red alder	Alnus rubra	3.6
Scouler's willow	Salix scouleriana	2.3
Shore pine	Pinus contorta	
Sitka spruce	Picea sitchensis	
Trembling aspen	Populus tremuloides	3.3
Western yew	Taxus brevifolia	3.4
Western hemlock	Tsuga heterophylla	
Western red cedar	Thuja plicata	
White birch	Betula papyrifera	
	SHRUBS	
Bog cranberry	Vaccinium oxycoccus	1.7
Broom	Cytisus scoparius	1.2
Canada blueberry	Vaccinium myrtillus	
Labrador tea	Ledum groenlandicum	1.7
English holly	Ilex acuifolium	
False azalea	Menziesia ferruginea	1.5
Hardhack	Spirea douglasii	1.6
Oregon grape	Mahonia nervosa	2.2
Oval-leaved blueberry	Vaccinium ovalifolium	2.3
Red elderberry	Sambucus racemosa	3.4
Red huckleberry	Vaccinium parvifolium	1.3
Salal	Gaultheria shallon	1.4
Salmonberry	Rubus spectabilis	3.6
Snowberry	Symphoricarpos albus	3.4
Stink currant	Ribes bracteosum	3.6
Swamp laurel	Kalmia polifolia	
Thimbleberry	Rubus parviflorus	3.4
Trailing blackberry	Rubus ursinus	2.2
Vine maple	Acer circinatum	3.5
Wild rose	Rosa gymnocarpa	1.3

Common names	Scientific names	EISG No.
FERNS AND FERN ALLIES		
Bracken	Pteridium aquilinum	3.3
Wood horsetail	Equistem sylvaticum	3.7
Deer fern	Blechnum spicant	1.6
Lady fern	Athyrium filix-femina	3.6
Licorice fern	Polypody glycyrrhiza	
Parsley fern	Cryptogramma crispa	2.1
Sword fern	Polysticum munitum	3.4
Spiny wood fern	Dryopteris assimilis	1.5
HERBS		
Bleeding heart	Dicentra formosa	3.5
Bunchberry	Cornus canadensis	1.4
Coltsfoot	Petasites speciosa	
Cloudberry	Rubus chamaemorus	
Dwarf mistletoe	Arceuthobium compylopodium	
False solomon's seal	Smilacina racemosa	3.4
False lily-of-the-valley	Maianthemum dilatatum	3.6
Fireweed	Epilobium angustifolium	
Foam flower	Tiarella trifoliata	
Grass spp.	Poaceae spp.	
Large-leaved avens	Geum macrophylum	3.5
Narrow-leaved cotton-grass	Eriophorum angustifolia	1.7
Round-leaved sundew	Drosera rotundifolia	1.7
Skunk cabbage	Lysichiton americanum	3.7
Twinflower	Linnaea borealis	1.4
Twisted stalk	Streptopus amplexifolius	3.5
Water parsley	Oenarthe sarmentosa	3.7
Western buttercup	Ranunculus occidentalis	3.4
Yellow pond lily	Nuphan polysepalum	
Youth-on-Age	Tolmiea menziesii	3.5
MOSSES		
Hanging moss	Antitrichia curtipendula	
	Atrichum selwynii	3.5
Golden short-capsuled moss	Brachythecium asperrimum	
	Dicranum spp.	1.3
Stepmoss	Hylocomium splendens	1.4
	Hypnum circinale	
	Isopterygium elegens	1.5
Thread moss	Isothecium stolonifera	
	Isothecium spiculiferum	

Common names	Scientific names	EISG No.
	MOSSES (cont'd)	
Palm tree moss	Leucolepis menziesii	
Star moss	Mnium glabrescens	2.4
	Mnium insigne	3.6
	Mnium nudum	3.6
Baby cedar moss	Plagiothecium laetum	
Cedar moss	Plagiothecium undulatum	1.5
	Pleurozium schreberi	
	Pogonatum contorum	2.4
	Rhytidiadelphus loreus	1.5
Electrified cat's tail moss	Rhytidiadelphus triquetrus	3.3
	Sphagnum spp.	1.7
Oregon beaked moss	Stokesiella oregana	2.2
Slender beaked moss	Stokesiella praelonga	3.6
	LIVERWORTS	
	Calypogeia trichomanis	1.5
	Lepidozia reptans	1.5
	Lophocolea cuspidata	
	Lophocolea heterophylla	
	Plagiochila porelloides	2.4
	Ptilidium californium	
	Scapania bolanderi	