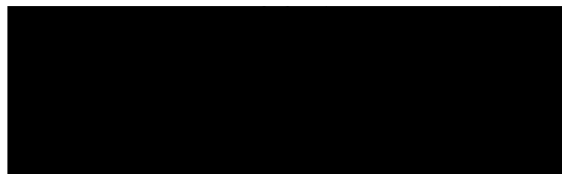


Biogeography Group Assignment

By:



GEOB 309

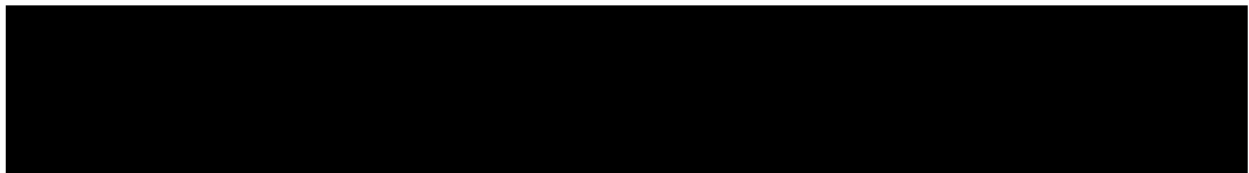


Table Of Contents

1. <u>Introduction</u>	3
1.1 Project Motivation	
1.2 Project Objectives	
1.3 Project Scope	
2. <u>Methods</u>	3
2.1 Field Procedure	
2.2 Data Analysis	
3. <u>Results</u>	4
3.1 Data Summary	
3.2 Density Of Each Species	
3.3 Diameter At Breast Height Of Each Species	
3.4 Moss and Canopy	
4. <u>Discussion</u>	8
4.1 Density Of Each Species	
4.2 Diameter At Breast Height Of Each Species	
4.3 Moss and Canopy	
4.4 Sources Of Error	
5. <u>Conclusion</u>	9

1| Introduction

1.1 Project Motivation

To determine the influence of forest type (disturbed or undisturbed) on tree species.

1.2 Project Objectives

The goal of this project was to draw conclusions and compare tree species density, diameter of species at breast height and moss and canopy layers between a protected and unprotected forest. From this data collected inferences can be made about the impacts a forest may be subject to by either being disturbed or undisturbed.

1.3 Project Scope

The main components of this project are as follows:

- To determine tree species density in both a disturbed and undisturbed forest.
- To determine the diameter of tree species at breast height in both a disturbed and undisturbed forest.
- To determine both the moss and canopy cover in both a disturbed and undisturbed forest.
- To draw conclusions about the influence of forests types (disturbed or undisturbed) on tree species.

2| Methods

2.1 Field Procedures

Two contrasting forest sites, unprotected and protected, were measured and the vegetation was described using a standard plotless method. The two sites are located on the property of the Cheakamus Centre. The unprotected site was located on a disturbed trail neighbouring Bob's Berm and the Cheakamus River, while the protected site was west of Paradise Valley Road along the Kiwi South Trail. After walking 10 to 20m into the trail, a random number of steps were taken based on a table of randomly generated numbers created using Microsoft Excel that fall between 10 and 50. At each point, a flag was placed at the centre of the trail and the nearest tree was measured for its distance to the flag. Each tree was also measured for circumference at 1.3m, used for the diameter at breast height (DBH) calculation, classified as dead or alive and moss cover. Moss cover was classified using the moss cover scale. On the moss cover scale, 5 represents full, thick moss cover completely around the tree (100%), 4 represents moss cover around the tree, but a few bare areas (80-99%), 3 represents moss cover > 50% but < 80%, 2 represents moss cover > 10% but < 50 %, 1 represents some moss on the tree <10% and finally 0 represents no moss on the tree. Additionally, at each flag the canopy cover was assessed using a chart for visual estimation of foliage cover.

2.2 Data Analysis

After the data was gathered, it was sorted and calculations for species density and diameter at breast height were completed. Species density was calculated using the equation:

$$D = \frac{A}{(2d)^2}$$

Where D = density; A = standard area (10000m^2); d = measured distance (m) from the random point on the trail to the nearest tree. Diameter at breast height was calculated using the relationship between circumference and diameter:

$$\text{Circumference} = 2\pi r \text{ and}$$

$$\text{Diameter} = 2r$$

Where r = radius. Statistical analyses of mean and standard deviation for the tree metrics were conducted using Microsoft Excel.

3| Results

3.1 Data Summary

Tree Species in Protected Forest	Density (Trees /Ha)	DBH (m)	Moss Cover	Canopy Cover (%)
Big Leaf Maple Black Cotton Douglas Fir Red Alder Sitka Spruce Western Red Cedar	Mean: 697.0 Sd: 2211.0	Mean: 0.46 Sd: 0.30	Mean: 3 Sd: 1	Mean: 51 Sd: 27

Figure 1: Data Summary of Protected Forest

Tree Species in Unprotected Forest	Density (Trees/Ha)	DBH (m)	Moss Cover	Canopy Cover (%)
Big Leaf Maple Black Cotton Red Alder Western Red Cedar	Mean: 188.6 Sd: 265.1	Mean: 0.35 Sd: 0.20	Mean: 2 Sd: 1	Mean: 44 Sd: 22

Figure 2: Data Summary of Unprotected Forest

3.2 Density Of Each Species

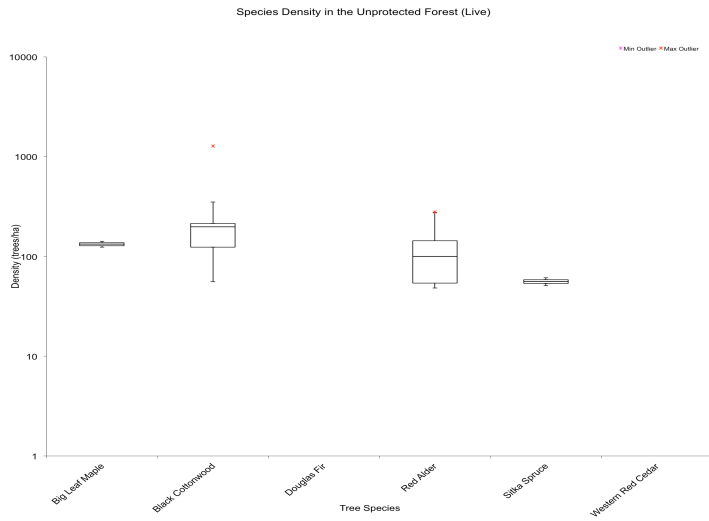


Figure 3: Density in Unprotected Forest

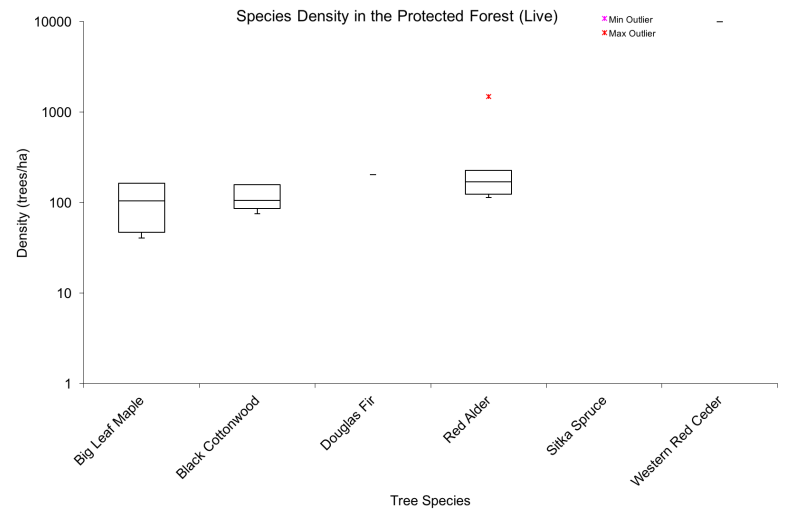


Figure 4: Density in Protected Forest



Figure 5: Density in Unprotected Forest



Figure 6: Density in Protected Forest

Referring to figures 3 and 4, when comparing the unprotected forest to the protected forest with regards to forest density, we found that the Big Leaf Maple and the Red Alder have a larger density in the protected forest, but in the unprotected forest, the Black Cottonwood had a relatively larger density. Figures 5 and 6 display a clear difference in densities between both forests with the protected forest possessing the greatest density.

3.3 Diameter at Breast Height Of Each Species

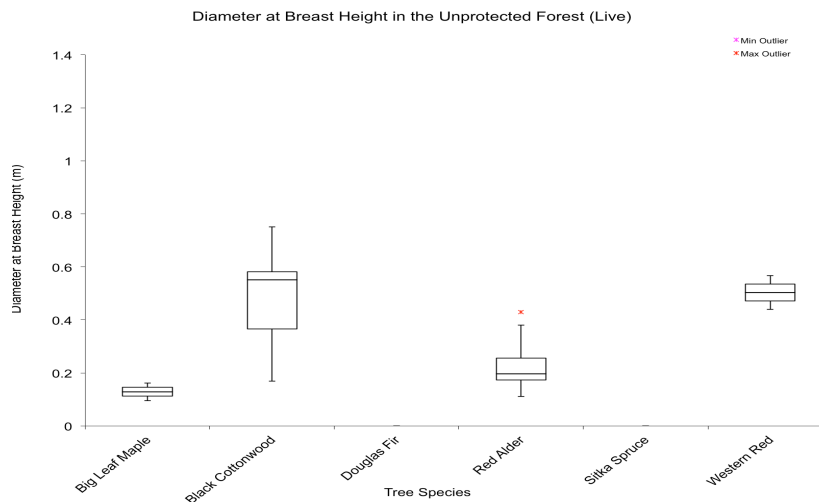


Figure 7: DBH in Unprotected Forest

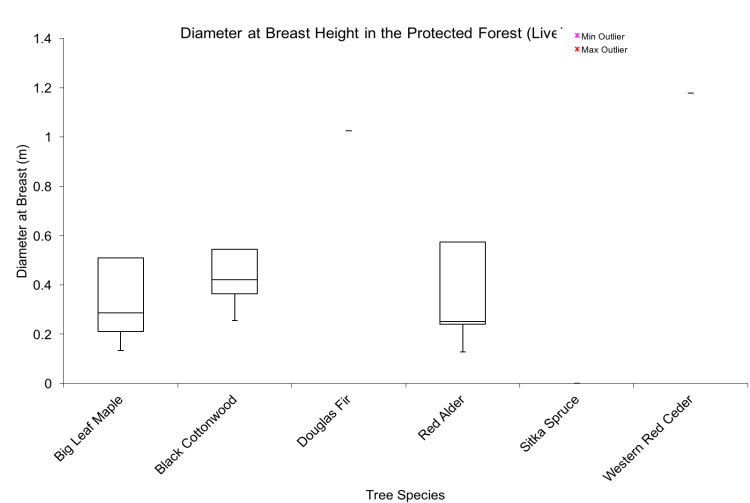


Figure 8: Density in Protected Forest

Referring to figures 7 and 8, we noticed there is a same tendency as the density distribution.

3.4 Moss and Canopy

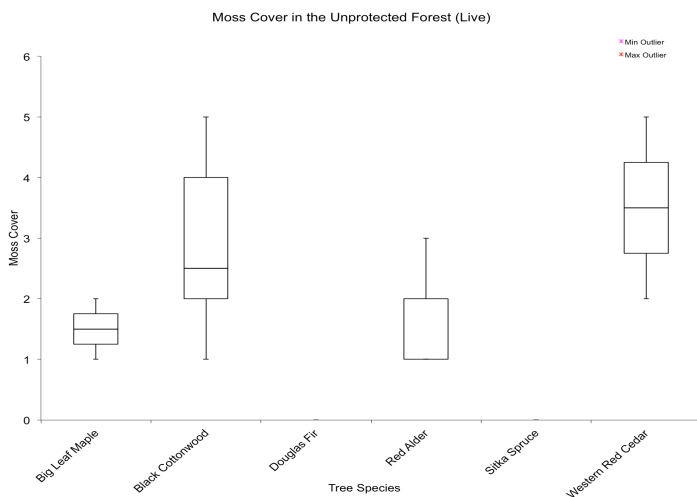


Figure 9: Moss in Unprotected Forest

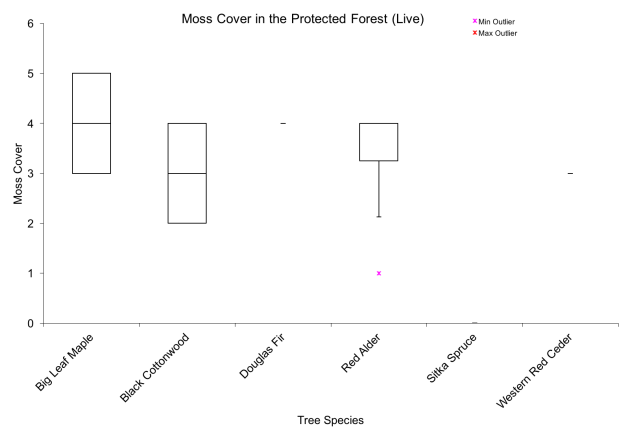


Figure 10: Moss in Protected Forest



Figure 11: Moss Cover in Protected Forest

Figures 9 and 10 display the moss cover between the protected forest and the unprotected forest. We found that the Big Leaf Maple and the Red Alder have less moss cover in the unprotected forest. On the contrary, the Black Cottonwood and the Western Red Cedar had more moss cover in the unprotected forest. Overall, the protected forest generally had more moss cover than the unprotected forest. Figure 11 is an example of the type of moss cover that was seen.

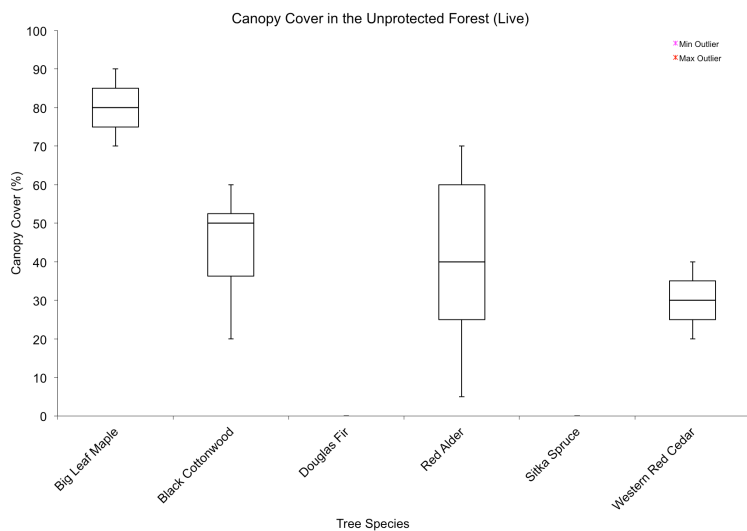


Figure 12: Canopy in Unprotected Forest

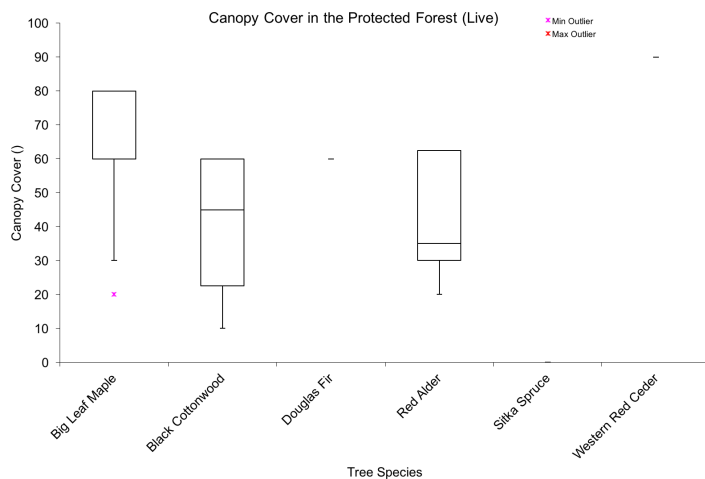


Figure 13: Canopy in Protected Forest



Figure 13: Canopy in Unprotected Forest



Figure 14: Canopy in Protected Forest

Figures 12 and 13 display that the canopy covers of the Big Leaf Maple, the Black Cottonwood and the Western Red Cedar were a little higher in the unprotected forest, but in the protected forest, the higher cover value only occur in the Red Alder. In general, the Big Leaf Maple usually had large canopy cover and moss cover compared to other trees no matter what forests they were. In addition, according to our analysis results, we also noticed a little difference of standard deviation between two forests. The standard deviation of the distance and circumference were close between two forests, but had a huge difference occurring in DBH. The protected forest had larger standard deviation in density than the unprotected forest, but the unprotected forest had larger standard deviation in DBH than the protected forest.

4| Discussion

4.1 Density Of Each Species

Based on the analysis, we found that the protected forest is denser compared to the unprotected forest. The higher density may be a result of increase nutrient availability and fewer anthropogenic disturbances in the protected forest. Additionally, the interception and subsequent evaporation of rainwater in the protected forest with higher density will result in less rainwater reaching the forest floor. Species that thrive in environments with less water are more likely to be found in this forest. In the protected forest, the species density is relatively similar between

the four species observed. This can be attributed to equal opportunity for the distribution of seeds.

4.2 Diameter at Breast Height Of Each Species

The diameter at breast height is often used to determine age of the tree and productivity. The diameter at breast height of trees in the protected forest are slightly larger than those of the unprotected forest, this again can be a result increased nutrient availability.

4.3 Moss and Canopy

Since the protected forest has slightly higher canopy cover compared to the unprotected forest, it is likely that many of tree species in the understory are less dependent on sunlight as trees with higher reaches would intercept a large portion of the sunlight. While trees in the understory may be less sunlight dependent, trees in the canopy layer are able to access sunlight and those that are able to compete and grow will benefit from being higher in the canopy. On the contrary, trees in the understory of the unprotected forest have more access to sunlight since there is less canopy cover. Trees in the canopy layer would have just as much access as those in the protected forest and would only be constrained by their ability to compete.

As expected, there is higher moss cover in the protected forest. Since there is more sunlight and more evaporation in the protected forest from leaves intercepting rainwater, there air is more humid and can support more moss growth on the trees. Conversely, in the unprotected forest, moss cover is less abundant and it may be due to the decreased humidity since rainwater is able to penetrate to the ground and less is intercepted and evaporated.

4.4 Sources Of Error

During our observation, we had found four potential errors. The first error was that the slope affected the accuracy of the distance. When we measured the distance from the flag point to the nearest tree, the surface was not flat. The slope would cause the tape to curve and it was difficult to create a straight line to the tree. This would cause the number we read to be greater than the real distance.

The second error was that the nearest tree approach may be imprecise. Normally there were two or more trees around the flag point, and these trees seemed to be the same distance to the flag. Thus, the trees we choose might be not the nearest one.

The third error was from our data. During the process, we collected the data for two dead trees, which were the nearest trees occurring around our flag point. However, the dead trees were not used in our analysis between two forest sites.

The last error we determined was a small sampling size. By only collecting 40 samples it was very difficult to get an accurate representation of the entire forest.

5| Conclusions

Based on the data we collected and analyzed it was found that the protected forest does seem to have a greater amount density, growth, moss cover, and canopy cover compared to the unprotected forest. We found no statistically large differences in our data, since there is overlap between the means and standard deviations. However, there are some minor differences that were observed and expressed in the two different forest types.