Restoration management plan for the UFV campus forest

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Management Plan Foundations

Why should UFV restore their campus forest?

- The Coastal Western Hemlock zone only comprises .2% of the worlds global forests
- Restoration could improve UFV student's health and well-being
- There is evidence to suggest low ecosystem function within the campus forest

Goals

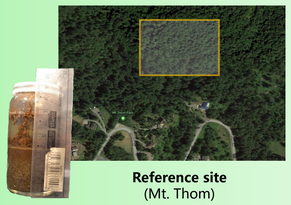
- Restore a disturbed forest
- Enhance ecosystem function
- Incorporate educational and social aspects in the campus forest

Methodology

- Belt transects
- Soil composition
- Plant identification
- Soil nutrient analysis
- Percent canopy coverage
- 15-min. observational walk

Target site
(Chilliwack UFV campus)

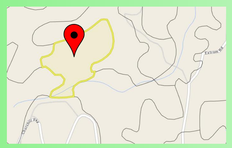
- Alluvial influenced
- High human disturbance (military base in WW2)



Reference site
(Mt. Thom)

- Glacial influenced
- Low human disturbance (local hiking trail)

Why was Mt. Thom chosen as the reference site?

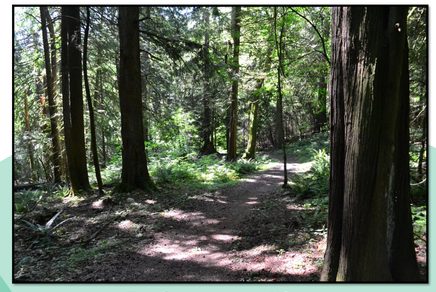


- Similar conifer species & age to the UFV forest (82-92 years old)
- Similar crown closure (60-70%)

The Situation

Target Site

Vs.



Reference Site

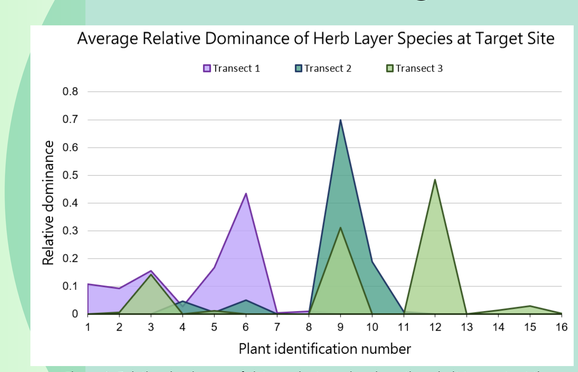


Figure 1. Relative dominance of sixteen plant species along three belt transects at the Target site. Richness and evenness differences between the Target and Reference sites are displayed in Table 1 using two sample t-tests, p<.05, and n=3.

Similarities
✓ Plant dominance
✓ Soil nutrient levels
✓ Shannon's diversity index
✓ Plant richness

Differences
✓ Soil ph
✓ Soil composition
✓ Plant evenness
✓ Plant composition

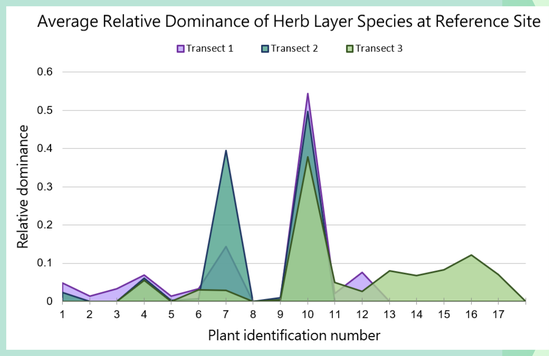


Figure 2. Relative dominance of seventeen plant species along three belt transects at the Reference site. Study sites have uncorrelated plant identification numbers.

Species ID
3 - Sow thistle (Sonchus oleraceus)
6 - Cleavers (*Gallium aparine*)
9 - Robert's geranium (*Geranium robertiannum*)
12 - Barn yard grass (*Echinochloa*)

	Richness	Evenness	Shannon's Index
Reference Site (Mt. Thom)	9.6	1.5	0.42
Target Site (UFV)	7.6	0.6	0.31
P-value	0.28	0.03	0.29

Table 1

Species ID
4 - Robert's geranium (*Geranium robertiannum*)
7 - Lady fern (*Athyrium filix-demina*)
10 - Sword fern (*Polystichum munitum*)
16 - Vine maple (*Acer circinatum*)

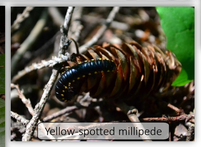
Ecosystem function analysis

(of the target site)

- Higher weed dominance
- Lower ph
- Less vegetation cover
- Lower soil biota

Leads to...

- Lower bacterial/fungi activity
- Slow infiltration rate
- Lower available water capacity
- Non-native plant competition



The Solution

1. Improvements in human disturbance

Desired outcome

- A pathway that limits soil compaction
- Increase education and awareness about ecosystem restoration

Actions required

- Remove gravel from current trail pathways
- Construct a boardwalk above the old trail
- Incorporate education boards

2. Improvements in natural management

Desired outcome

- Reduce the total weed coverage

Actions required

- Cutting/hand pulling to prevent soil disturbance

3. Improvements in biotic/abiotic interactions

Desired outcome

- Increase native species
- Increase species evenness
- Indirectly enhance water capacity, soil biota activity, soil infiltration rate

Actions required

- Re-introduce species such as: sword fern, lady fern, red elderberry, and wild Pacific bleeding heart
- Add habitat features such as: snags, coarse woody debris, and nurse logs

Glossary

Weed species: any species that has been recognized by the BC Conservation Data Centre of BC flora
Available water capacity: the minimum amount of water soil can retain and make available for plant use
Infiltration rate: the speed at which water moves through the soil
Alluvial soils: deposited by surface water that is formed by flooding

References
1. Department of Biology. (2015, Fall). Bio 210 lab manual. BCL University of the Fraser Valley.
2. Pojar, J, & Demarchi, d. (1991). 6: Coastal western hemlock zone. In *Ecosystems of British Columbia* (pp. 95–111). Victoria: crown publications Inc.
3. Pojar, J., & Meidinger, D. (1991). BC: The Environmental setting. In *Ecosystems of bc* (pp. 39–67). Victoria: BC ministry of forests.
4. Holloway. (2019, January 14). Soil Tests and Soil Reports: Soil Amendments for Clay Soil and Sandy Soil. Retrieved from https://holloway.ag.com/resources/soil-reports/
5. Lousier, J., & Parkinson, D. (1976). Litter decomposition in a cool temperate deciduous forest. *CAN. J.Bot.* 54, 419–436.
6. Munoz-Rojas, M. (n.d.). Soil quality indicators: critical tools in ecosystem restoration. *Sustainable Soil Management*, *5*, 47–52.
7. Sanborn, P., Lamontagne, L., & Hendershot, W. (2011). Podzolic soils of Canada: Genesis, distribution, and classification. *Can.J.Soil Sci.* *91*, 843–880.
8. Stevens, V. (1997). *The ecological role of coarse woody debris: an overview of the ecological importance of Cwd in B.C. forests*. Victoria, BC: Production resources.
9. Taiz, T., Zeigar, E., Moller, I., Murphy, A. (2018). *Fundamentals of Plant Physiology*. Oxford, New York: Oxford University Press.
10. Zhang, D., Hui, D., & Zhou, G. (2008). Rates of litter decomposition in terrestrial ecosystems: global patterns and controlling factors. *Plant Ecology*, *1*(2), 85–93.