A Detailed Look at Scrubby and Woodland Garry Oak *(Quercus garryana)* and Douglas-Fir *(Psuedo-tsuga Menziesii)* Ecosystems, Invasive Species, and Removal of *Daphne laureola* in an Urban Park Under Development in View Royal, British Columbia

M. Sawatzky

University of Victoria

Submitted for course ER 390 (Environmental Restoration Project) as a part of completion of the Restoration of Natural Systems Program at the University of Victoria in Victoria, BC.

INTRODUCTION

The research and data presented in this report documents the current ecology, tree distribution & health, invasive species colonization, and monitoring & removal of *Daphne laureola* at an urban park in View Royal, southern Vancouver Island, British Columbia. This project was made possible by Valentin Schaefer and the Restoration of Natural System program at the University of Victoria through Environmental Science and Continuing Studies and is being submitted for course ER 390 (Environmental Restoration Project). The intent is that document is useful in the monitoring and inventory of the site for future work, and re-enforces the fact that we need to realize the recommendation of regular invasive species removal in View Royal and throughout the City of Victoria. The management plan for the site was developed by Amanda Evans in 2011, submitted to the city of View Royal by GOERT, and outlines a well-designed rigorous restoration plan. After 5 years it appears the park has gone by the wayside with regards to restoration. Invasive species run rampant and have choked out native vegetation throughout park, and continue to spread, everyday. This park contains threatened Garry Oak and Coastal Douglas Fir ecosystems and rare species only found therein. In order to conserve it we as a city and its citizens we must act now.

Author's Credentials
Bachelor's of Science in Earth and Ocean Sciences with a minor in Geography and Honors in Structural Geology from the University of Victoria in Victoria, BC.
Restoration of Natural Systems Diploma through Continuing Studies in conjunction with the Environmental Sciences department, also from the University of Victoria, in Victoria, BC, Canada.

TABLE OF CONTENTS

1.0 BACKGROUND 1
1.1 Location 1
1.2 Biogeoclimatic Zone 2
1.3 Garry Oak Ecosystems and Distribution 2
1.4 Species At Risk 3
1.5 Invasive Species 3
1.5.1 *Daphne laureola* 4
1.6 Climate 5
2.0 SITE DESCRIPTION 6
2.1 Geology 7
2.2 Surficial Geology 7
2.3 Soils 9
2.4 Hydrology 9
2.5 Disturbance History 10
2.6 Air Photo Monitoring 10
2.6.1 Habitat Loss 12
3.0 OBJECTIVES AND DELIVERABLES 12
4.0 METHODOLOGY 12
4.1 Data Sources and Background Research 12
4.2 Location/Orientation Data Acquisition 12
4.3 Field Work 13
4.4 Tree Mensuration 13
4.5 Species Identification 13
4.6 Terrestrial Ecosystems Mapping 13
4.7 Invasive Species Mapping 14
4.8 Invasive Species Removal 14
4.8.1 Determination of Removal Zones 14
4.8.2 Organization of Work Party 14
4.8.3 Best Management Practices 14
4.8.4 Work Party 15
4.8.5 Follow-up Removal 15
4.9 Interpretive Signs 15
4.9.1 Sign Construction 16
4.9.2 Final Touches 16
4.10 Photo Point Monitoring 16
4.11 Map Products 16
5.0 RESULTS AND DISCUSSION 17
5.1 Species List 17
5.2 Tree Study 19
5.2.1 Comparison of Tree Species 22
5.2.2 Native Tree Distribution 23
5.2.3 Tree Age Relationships 24
5.2.4 Native Tree Decay and History 25

5.2.5 Exotic Tree Distribution 27
5.2.6 Exotic Tree Decay and Mensuration 28
5.2.7 Trees Infested with *Hedera helix* 28
5.2.8 Mosses On Trees 29
5.2.9 Lichens On Trees 29
5.2.10 Fungi On Trees 29
5.3 Wildlife Tree Assessment 29
5.4 Coarse Woody Debris 30
5.5 Terrestrial Ecosystem Mapping 30
5.5.1 Garry Oak Outcrops (OMvw1b) 31
5.5.2 Brome/Mixed Grasses (QB6tM) 32
5.5.3 Nootka Rose (OR6iM) 33
5.5.4 Mixed Garry Oak – Douglas-fir Forest (GO6iM) 33
5.5.5 Black Hawthorn (GOgy6iM) 34
5.5.6 Snowberry – Oceanspray (GO6sB) 34
5.5.7 Alaska Oniongrass – Orchardgrass (DOf6iM) 34
5.5.8 Grand Fir – Oregon Grape (DGx6iC) 35
5.5.9 Salal – Bracken Fern (DS6sC) 36
5.5.10 Mixed Douglas-fir Garry Oak Forest (DGgyf6iM) 36
5.5.11 Red-Osier Dogwood – Black Hawthorn (CD6iM) 37
5.5.12 Gravel Trail Network (TR1a) 37
5.5.13 Partly Cleared and Compacted Soils (ES2a) 37
5.5.14 Seasonal Wet Depression (ES1a) 38
5.6 Rare and Endangered Ecosystems 38
5.7 Wildlife 38
5.7.1 Insects 38
5.7.2 Butterflies 39
5.7.3 Reptile Case Study – European Wall Lizard 39
5.7.4 Birds 40
5.7.5 Pollinator Interaction with Invasive Species 40
5.7.6 Mammals 41
5.8 Invasive Species Mapping 42
5.8.1 Habit and Distribution of Daphne laureola 43
5.8.2 Habit and Distribution of Invasive Vegetation 43
5.8.3 Spread of Invasive Vegetation 44
5.9 Daphne laureola Removal 44
5.10 Photo Point Monitoring Sites 47
5.11 Possibility of Rare/Threatened Native Species 49
5.12 Interactions with Residents 49
5.13 Interpretive Sandwich Board Signs 49
5.14 Threats 51
5.15 Climate Change 51
6.0 RECOMMENDATIONS 51
7.0 CONCLUSIONS 52
ACKNOWLEDGEMENTS 53
REFERENCES CITED 53

APPENDICES

Appendix A. Best Times To Remove Invasive Species in Victoria
Appendix B. Tree Decay Guide
Appendix C. Grass Species Identified at Burnside Corner Park
Appendix D. Best Practices for Management of *Daphne laureola*
Appendix E. Interpretive Sign Design
Appendix F. Tree Data
Appendix G. Large .pdf Versions of Resultant Maps
Appendix H. Invasive Species Distribution 2011
Appendix I. Photo point location map
Appendix J. Representative photograph from all photo point locations
Appendix X. Field Notes*
* physical copies submitted in person and thus are not a part of this .pdf document

LIST OF FIGURES

Figure 1. Location map 1
Figure 2. Present range of Garry Oak ecosystems in Canada 2
Figure 3. Distribution of Garry Oak meadows in the Victoria area 3
Figure 4. Daphne laureola 4
Figure 5. Representative Climate Diagram for the CDFmm 5
Figure 6. Site map 6
Figure 7. Study site and adjacent area zoning 7
Figure 8. Roche moutonnee 8
Figure 9. Air Photos and Satellite Imagery from 1933 to 2016 10-11
Figure 10. Distribution of All Trees at Burnside Corner Park 20
Figure 11. Trees showing decay >1 at Burnside Corner Park 21
Figure 12. Percent of population with decay (bar graph) 22
Figure 13. Comparison of tree species (pie charts) 23
Figure 14. Distribution of native trees 24
Figure 15. Relationships between age and dbh 25
Figure 16. Native tree dbh plotted against decay 26-27
Figure 17. Distribution of exotic trees 27
Figure 18. Trees infested with English Ivy at Burnside Corner Park 28
Figure 19. Ecosystem Units of Burnside Corner Park, View Royal, BC 31
Figure 20. Garry Oak Outcrops ecosystem unit 32
Figure 21. Douglas-fir dominated ecosystem units (DOf6iM, DGx6iC) 35
Figure 22. Douglas-fir dominated ecosystem units (DOf6iM, DGgyf6iM) 36
Figure 23. Disturbed ecosystem unit (ES2a) 37
Figure 24. European wall lizard 39
Figure 25. Fawn in scrubby Garry Oak 41
Figure 26. Invasive Species at Burnside Corner Park – July 2016 42

Figure 27. Invasive Species at Burnside Corner Park – August 2016 ……..…….. 45
Figure 28. Photographs of the removal team and debris piles ……..... 46
Figure 29. Photo Point Monitoring Site Before and After …….. 47-48
Figure 30. Photograph of the sandwich board interpretive sign …….. 50

LIST OF TABLES

Table 1. Climate Information for the Burnside Corner Park project site ……. 5
Table 2. Tree data collected and calculated for Burnside Corner Park ……... 20
Table 3. Photo point monitoring locations and information …….. 47

1.0 BACKGROUND

1.1 Location

The project site is located on southern Vancouver Island in the city of View Royal, British Columbia approximately one kilometer inland from the Pacific Ocean. The study site is mostly designated parkland with a few short trails in an area close to two new apartment developments. Named Burnside Corner Park (BCP), the study area is centered on 467138 mE and 5368090 mE at an elevation of ~27 meters above sea level. Access for the park is good, and can easily be found by taking the Helmecken road exit off of the Trans Canada Highway, and going West on Watkiss Way. The park is on the corner of Burnside Rd. and Watkiss Way, a short drive from the Eagle Creek Village shopping centre and Victoria General Hospital. Please see *Figure 1* below for location map.

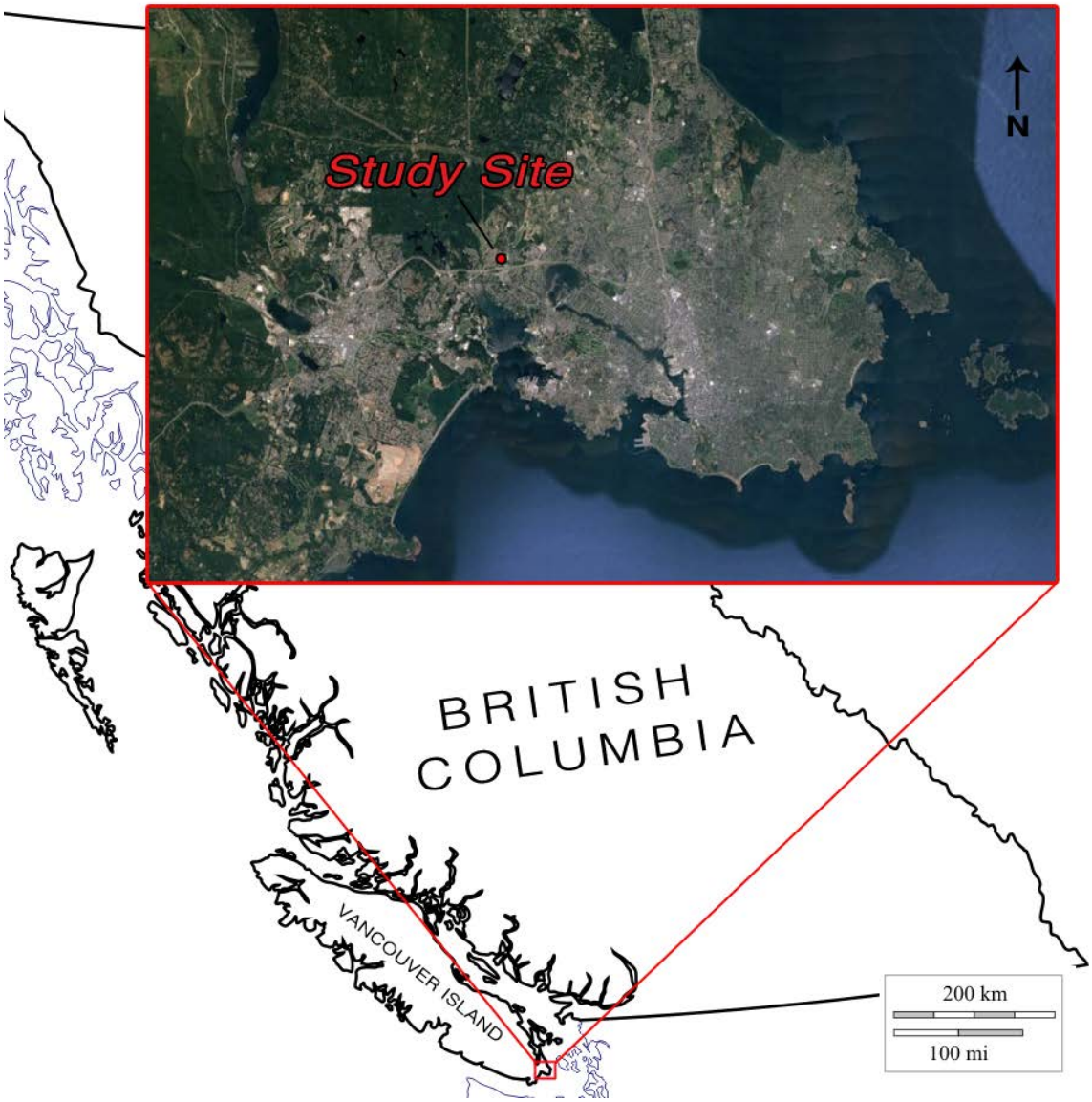


Figure 1. Location map. *(Satellite image courtesy of GoogleEarth, BC outline courtesy of d-maps.com)*

1.2 Biogeoclimatic Zone

The study location lies in the Coastal Douglas Fir - moist maritime (CDFmm) biogeoclimatic zone. This area ranges from the southern tip of Vancouver Island, and along the Eastern edge up to around Nanaimo, with a few coastal locations on the mainland, from elevations of 0 to 150 meters + above sea level. Total area of the CDFmm makes up less than 0.3% of the province, yet it contains a diverse assemblage of vegetation and characteristic plant associations (Zinovich, 2008). An important component of this biogeoclimatic zone is Garry Oak and associated ecosystems, which are located within the CDFmm and the range of these ecosystems is shown in *Figure 2*. Garry Oak ecosystems are home to more plant species than any other ecosystem in British Columbia and at least 694 plant species alone have been identified in these areas (Fuchs, 2001). Many of these species are critically imperiled in British Columbia and globally rare (Fleming, 2000; Murray, 2003). Britich Columbia hosts the only Garry Oak ecosystems in Canada.

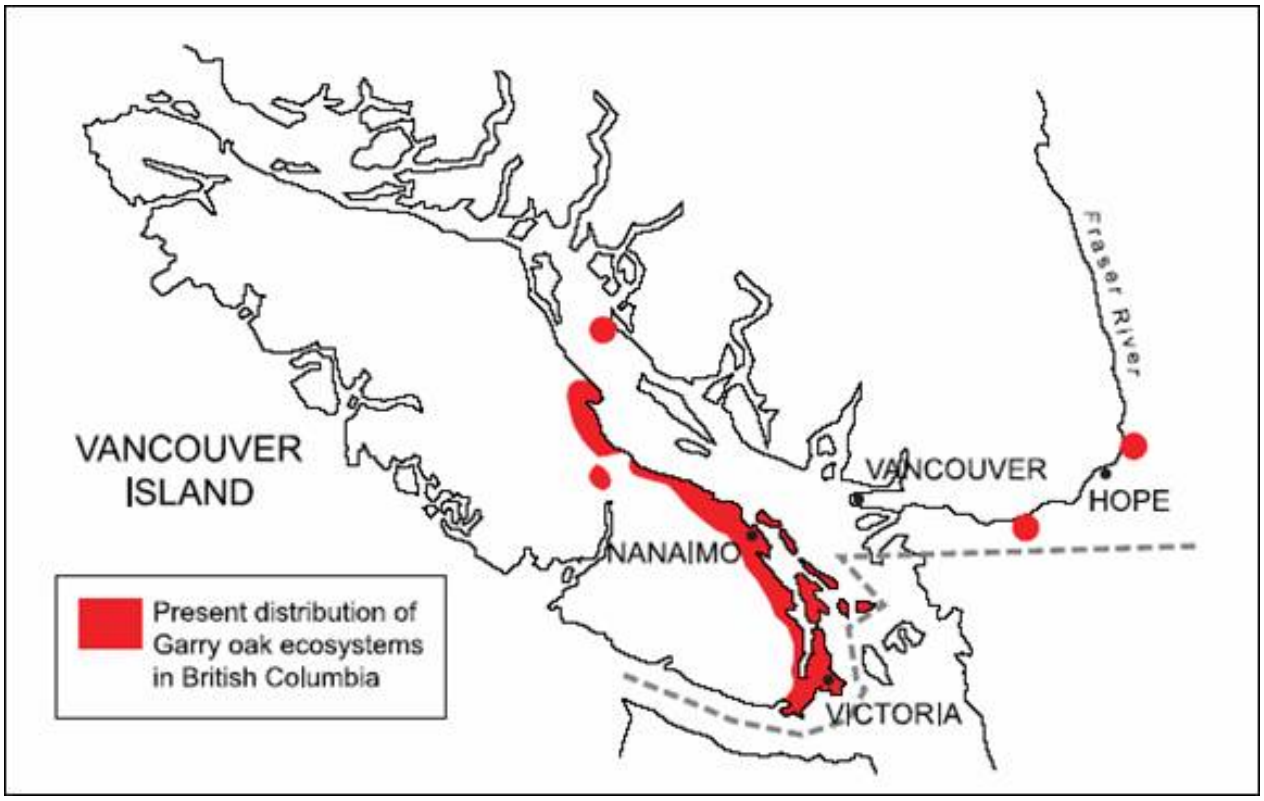
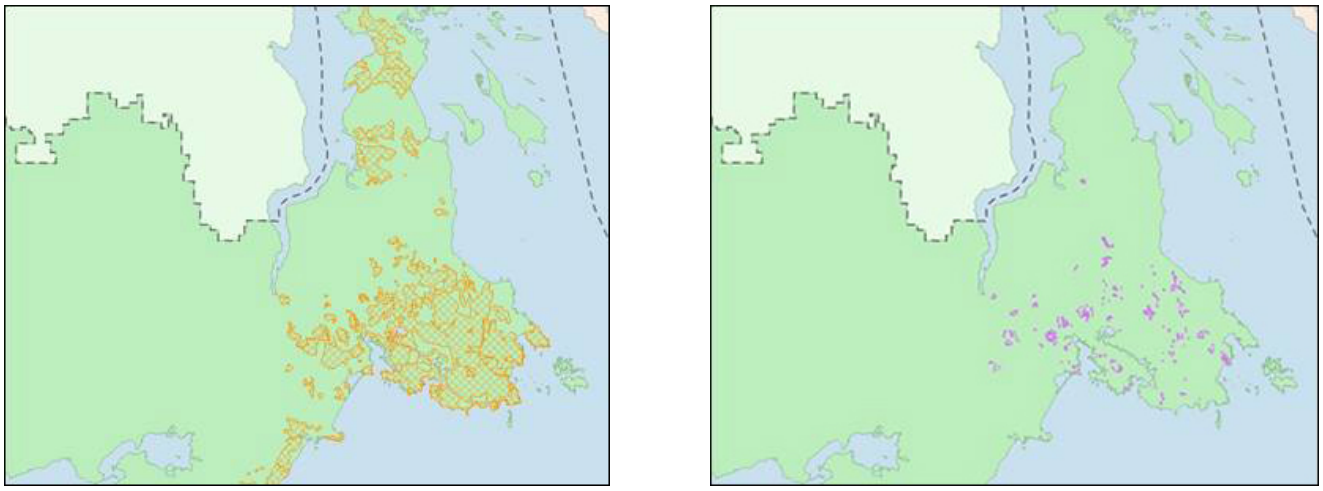


Figure 2. Present range* of Garry Oak ecosystems in Canada. *(Image courtesy of CRD, n.d.) *Distribution implies this area is filled with Garry Oak ecosystems when in fact it is just a small collection of isolated patches remaining.*

1.3 Garry Oak Ecosystems and Distribution

European settlement of Vancouver Island has caused a marked decline in distribution of Garry Oak meadows and associated ecosystems. Less than 5% of the original habitat has remained in a near-natural condition (Murray, 2003). After initial settlement in the early 1800s there was influx of migrants from Europe and as populations grew, more and more land was cleared for roads, houses,

orchards and farmland. The majority of Garry Oak ecosystems have been lost to developmental pressures (Fleming, 2000) which is evident by the comparison of distribution of these ecosystems in *Figures 3 (A) and (B).* This current trend of rapid biodiversity loss due to developments degrades the resilience of these ecosystems, making them more vulnerable to invasions by exotic species (Schaefer, 2011). It is important to protect and restore what remains to give the native species in these ecosystems a chance to regenerate and persist.



(A) (B)

Figure 3. Distribution of Garry Oak meadows in the Victoria area. (A) circa 1800, (B) 1997. *(Image courtesy of CRD, n.d.)*

1.4 Species At Risk

A search through SARA (Species At Risk) yielded 95 BC Red List, and 107 BC Blue Listed species in View Royal, BC. The COSEWIC Endangered species count was 46, Threatened was 21, and Special Concern was 24. All of these species at risk rely on the remaining patches of Garry Oak *(Quercus garryana)* and Douglas-Fir *(Psuedo-tsuga menziesii)* for habitat to survive, which many themselves are COSEWIC ecosystems at risk.

1.5 Invasive Species

Invasive species are numerous on Vancouver Island, and now these various introduced ornamental plants that escaped the garden occupy vast stretches of territory. Effects of invasive species have contributed greatly to the decline of native flora and fauna in the Pacific Northwest and can modify the structure, diversity and functions of natural habitats (Dennehy et. al., 2011). The major invasive shrubs threatening CDFmm ecosystems are Scotch Broom *(Cytisus scoparius)*, English Ivy *(Hedera Helix),* English Holly *(Ilex aquifolium),* Himalayan Blackberry *(Rubus armeniacus)*, and Spurge-laurel *(Daphne laureola)*. All of these invasives and many more are present at the project site but we will focus on the removal of *Daphne laureola*. This species was chosen for the restoration project as per recommendations from the Burnside Corner Park Management Plan (Evans, 2011); and is the dominant invasive species at the site. A chart with the best times to remove invasive plants in Victoria can be found in *Appendix A.*

1.5.1 Daphne laureola

Daphne laureola, also known as Spurge-laurel is an ornamental plant species originally from Europe, natively growing in Mediterranean-like climates in regions of Europe and North Africa (Lei, 2014). It was brought over to Vancouver Island post-settlement as an ornamental shrub. After escaping the garden, *Daphne* became highly invasive, occupying large sections of land on Southern Vancouver Island, and doing so has been crowding out numerous native species. It is a woody evergreen shrub with narrow, pointed leaves and produces black berries in late spring/early summer *(refer to Figure 4).* This plant produces poisonous sap ala *Euphorbia spp.,* and all parts of the plant are fatally poisonous to humans, cats and dogs if ingested. The poisonous compound within the plant has been isolated and is termed daphnetoxin, $C_{27}H_{30}O_8$ (Stout, 1969), and this species made the top 3 of the WorkSafeBC Toxic Plants List (WorkSafeBC, 2006).

Figure 4. *Daphne laureola.* Main photo - large infestation; Circle - berry habit; Square - leaf shape and appearance. All photos taken at Burnside Corner Park in July, 2016.

1.6 Climate

Southern Vancouver Island lies in the rain shadow of the Olympic Mountains (Washington) and the islands coastal ranges (Fuchs, 2001; Nuszdorfer, n.d.), and thus receives substantially less precipitation than other coastal areas in the Pacific Northwest. The dry, humid Mediterranean-like climate is the mildest in Canada with cloudy/wet winters and hot/dry summers (Fleming, 2000). See *Figure 5* for a representative climate diagram for the CDFmm biogeoclimatic zone.

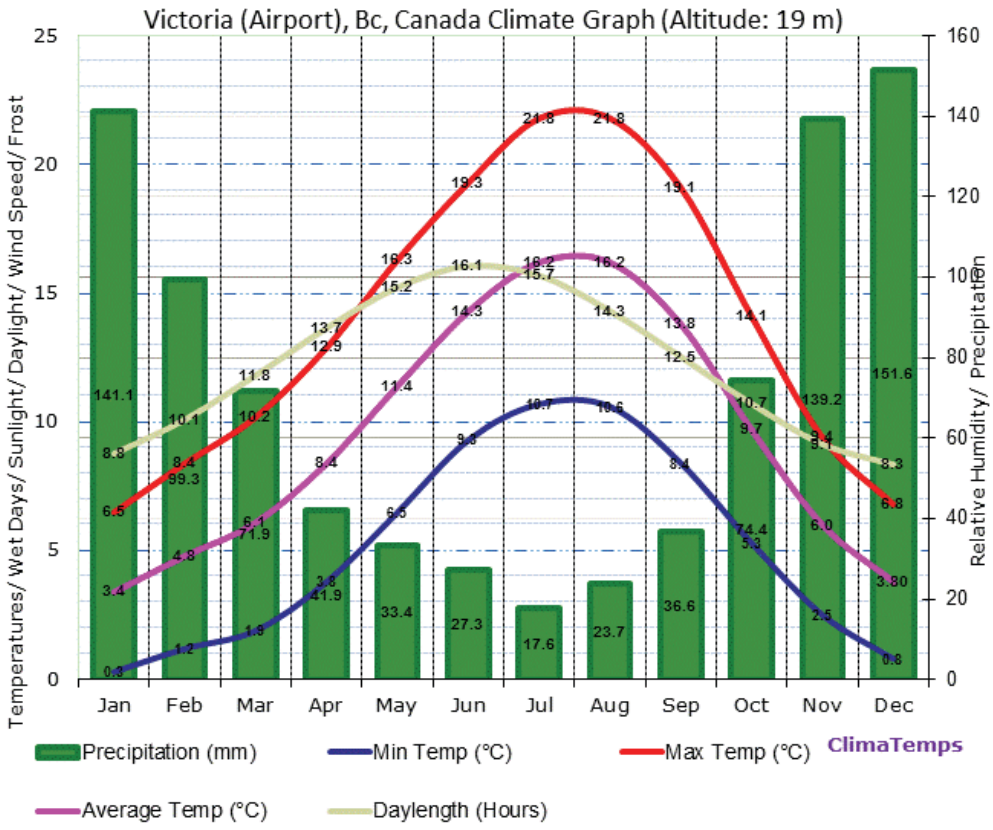


Figure 5. Representative climate diagram for the CDFmm. Data taken from the Victoria International Airport weather station. *(Image courtesy of ClimaTemps, 2014)*

At the project site the mean annual temperature is 10.4 °C, mean warmest month is 16.9 C, mean coldest month is 4.8° C, and mean annual precipitation is 897 mm (Wang et. al., 2012). This information was retrieved using ClimateBC from a point centered on Burnside Corner Park. Please refer to *Table 1* for a list of climate information specific to the study site.

Mean annual temperature (°C)	10.4
Mean warmest month temperature (°C)	16.9
Mean coldest month temperature (°C)	4.8
Mean annual preciptiation (mm)	897
May to September Precipitation (mm)	137
Annual heat-moisture index	22.8
Summer heat-moisture index	123.7
Degree days below 0°C, chilling degree-days	71
Degree-days above 18°C, cooling degree days	96
Number of frost-free days	321

Table 1. Climate Information for the Burnside Corner Park project site from 1981-2010. *Data obtained using ClimateBC (Wang et.al., 2012).*

2.0 SITE DESCRIPTION

The study site encompasses an area of approximately 14,000 m^2 and is shaped like a pie with a corridor orientated NE between the two apartment developments on either side. With the developments has come the construction of a short, gravel trail system. The trail is approximately 2.5 m wide and it winds this way and that around outrcrops and through the north-east corridor, giving it quite a natural feel. The trails have split up the park into four isolated patches, which for the purposes of this report have been named zones 1, 2, 3, and 4 *(refer to Figure 6. for map showing zones and trail network).* A square section of the park in the southwest corner has been zoned for development and is outlined with black hash-marks in Figure 6 *(also see Figure 7, next, for lot zoning of the study site)*. The remainder of the lot is designated parkland "CD-10" by the city of View Royal and so is reasonably safe from further zonation. The lot sold for development, site 'C' (referred to as this throughout the report) has been included in the study as a part of zone 4 to provide historical documentation of the current ecology.

Figure 6. Site map. Study area boundary – red outline. Trail system – yellow lines. Area sold for development – hashed black line. Numbers correspond to isolated zones referenced throughout the report. *(Satellite photo courtesy of GoogleEarth, acquired June 7th, 2015)*

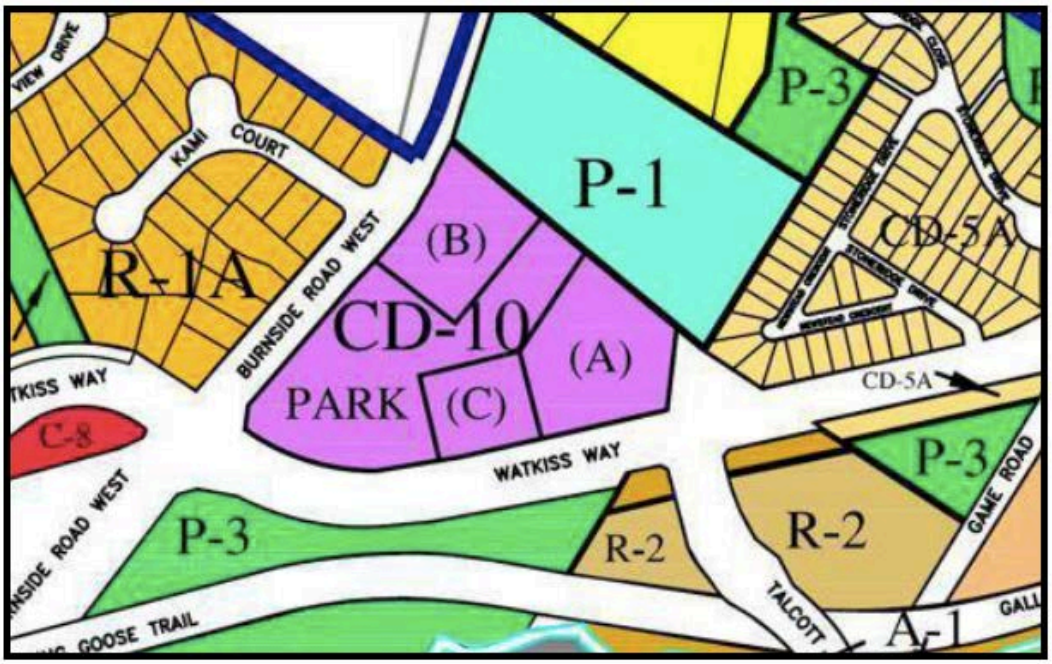


Figure 7. Study site and adjacent area zoning. *(Image courtesy of Evans, 2011 and View Royal OCP)*

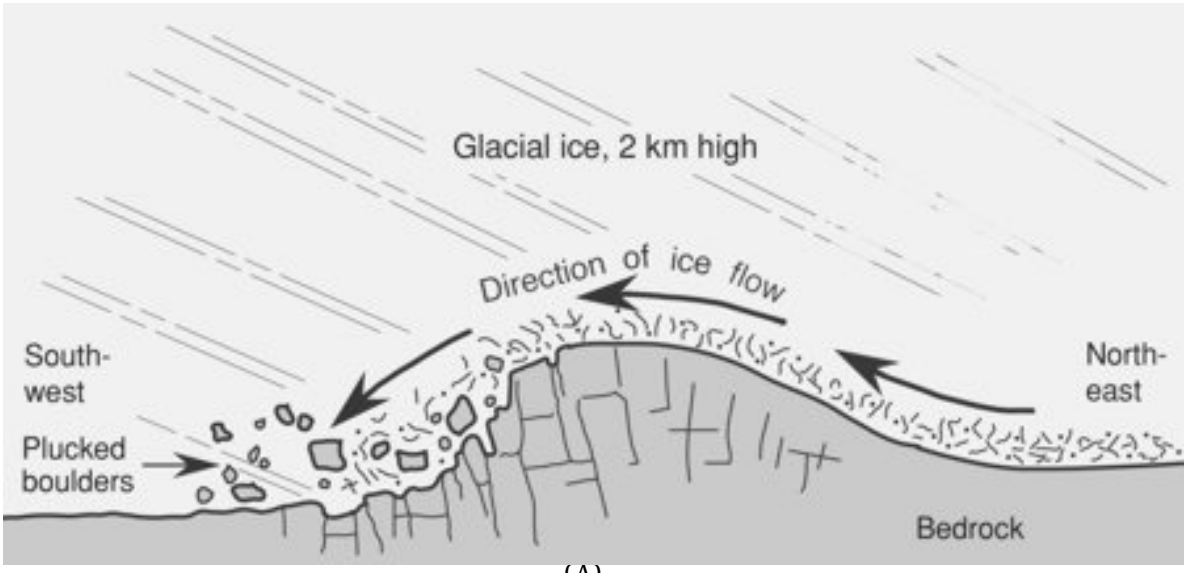
2.1 Geology

The area is underlain by metamorphosed intermediate intrusive igneous rock, which initially formed during the Paleozoic-Jurassic. This took place on what was actually apart of a geologic terrane called Wrangellia that travelled from South of the equator (determined using fossil studies) to its current position, locking with the North American plate in the Mesozoic period (~100 Ma); furthermore, it is inferred that metamorphism/deformation were completed in the Eocene period (39-41 Ma) (Fairchild and Cowan, 1982; Rushmore and Cowan, 1985). The altered version of the diorite/amphibolite protolith is called gneiss, which most often shows wavy banded layers of light (plagioclase, quartz), and dark (biotite, hornblende, +/- pyroxene) minerals. The BCGS has named this gneissic rock in this terrane the Wark Gneiss and the majority of southern Vancouver Island is this rock type. Locally there are quartz veins present, greenschist mineralization (chlorite, epidote altering from biotite & feldspar respectively) in shear zones, and felsic dykes infilling faults and fractures. The rock in general is very competent, weathers extremely slowly, and breaks happen along fractures creating blocky talus at the base of slopes.

2.2 Surficial Geology

There are numerous glacial features present at the project site. These include roche moutonnee, meltwater channels, and striae/grooves cut into the bedrock. Roche moutonnee is the characteristic geomorphology to most of the bedrock at the study site, consequence to pressure melting on the stoss side and materials being plucked from the lee side upon refreezing (less pressure) and movement of glacial ice (refer to Figure 8, next, for diagram). Roche moutonnee and meltwater channels were orientated between 184° and 216° indicating that the ice sheet was moving south-west as it flowed into the Pacific. The surficial geology code of the study area is (dW^{G}b/dMb)/R (Blyth and Rutter,

1993). The modifiers are as follows, d – diamicton, W^G – glaciomarine, b/d – boulder more extensive than diamicton, M – morainal, b – blanket; all sitting on top of R – bedrock. The area has been mapped as glaciomarine, meaning that the sediment was deposited in a marine environment (under water) proximal to glacial ice. The weight of the Cordilleran Ice Sheet (Last Glacial Maximum) had the majority of southern Vancouver Island below sea level at that time and since has experienced at least 100 m of isostatic rebound to its current state (Shugar et. al. 2014).



(A)

(B)

Figure 8. Roche moutonnee. (A) Formation of Roche Moutonnee in glaciomarine environment. Ice flow at the project site did go from North-east to South-west as indicated by glacial feature orientation. (Image courtesy of UWCM Geography). (B) Roche moutonnee near the entrance to the main gravel trail at the study site (off Burnside Road) orientated in the same direction as the diagram.

2.3 Soils

The area is underlain by soil created in situ (on shallow bedrock areas), and surrounding areas are covered with a blanket of glaciomarine till termed diamicton. Very shallow soils on bedrock are 1-3 centimeters deep, very dark, and rich in organics. Larger, more angular fragments occur in the soil fraction with proximity to bedrock (40-60%). The glacial till (diamicton) is a medium grey, homogonous, mostly silt/sand sized, unsorted, with 5-15% rounded to sub-rounded gravel to cobble sized clasts. The rooting depth is generally within the first 10-20 cm and soil depth increases down-slope and with distance from bedrock outcrops. Soil moisture regimes varied but the soil nutrient regime was rich to very rich in all soil pits dug on site. Drainage varies from well-drained on outcrops to moderately well drained surrounding outcrops and on mid-slope positions, to somewhat poorly drained in gullies and convex areas with shadier north-facing aspects.

2.4 Hydrology

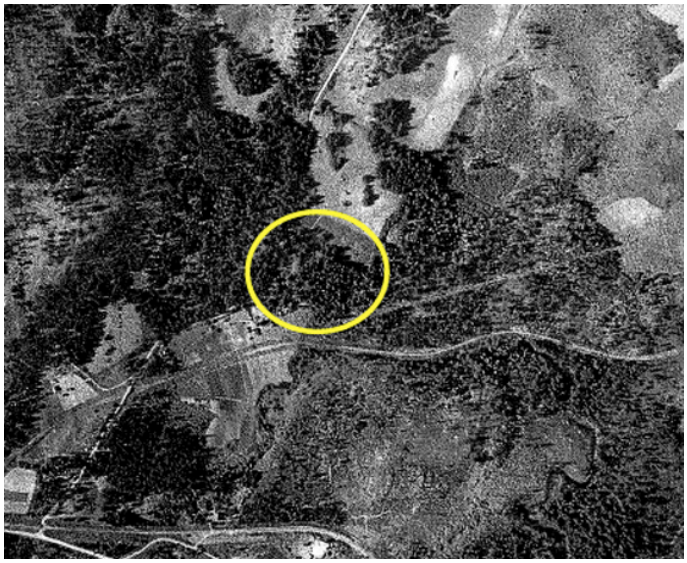
Burnside Corner Park lies within the Craiglflower Creek watershed and ultimately drains into the Gorge Waterway (Evans, 2011). On site the water flows down topography from the north-east to south-west from an elevation of approximately 42 m asl to 24 m asl . Observations indicate the majority of the water flows down a main gully in zone 4, which runs into a seasonal wet depression down-slope. There is another gully that parallels this main one to the south-east, which is marked by a dip in the trail and change in vegetation. The gullies are adjacent to and paralleling bedrock outcrops making a one to three meter steep drop in topography into these wetter sites. The other more moisture-rich areas on site are the north/north-east shadow-zones of large (2 m +) outcrops. These sites are concave, receive moisture off of bedrock, and have cool north-facing aspects. A medium-bench floodplain is likely along the north-west edge evidenced by the presence numerous *Cornus sericea* (Red-Osier Dogwood) and lack of moss/litter layer. Site hydrology has been altered extensively by adjacent human developments. The apartment buildings and roadways adjacent to the site have impermeable surfaces which decreases the amount of water soaked into the forest floor and as consequence lowers the ground-water table. A 1-2 meter deep drainage ditch has been installed parallel to the park on the north-west side (along Burnside Road). This ditch runs beside the floodplain area, possibly allowing for flash flooding but also possibly diverting smaller, regular flash floods. Two white ~10 cm diameter pipes have been installed side-by-side beneath the main trail at two locations. These drain into 1. a convex area shadowed by outcrop, and 2. the smaller gully in zone 4. It is assumed these are not cleaned regularly as they have 30-60% of sediment and leaf litter accumulating (noted on site visits through July-August, 2016). Also their placement is very close to the apartment building in the north-west corner so it is a mystery as to how much water actually travels through these even during a rain or if it mostly drains into the adjacent man-made ditch. The fact that neither of these installed drainage pipes are running into the main gully connected to the seasonal wet depression has numerous consequences. Both of the areas where the water is being routed are dense with *Daphne laureola*, which form branching patches into downstream reaches of the site and could therefore be altering the ecosystem down-slope to allow for easier invasion by *Daphne* and other invasive species. Another consequence is the seasonal wet depression drying up. It is filling with leaf litter and slowly being colonized by invasive species, and trees in and around that area also looked relatively dry. This has not only altercations for the vegetation at the margins but also for the wildlife and micro-organisms that may rely on the presence of ephemeral pools through wetter months.

2.5 Disturbance History

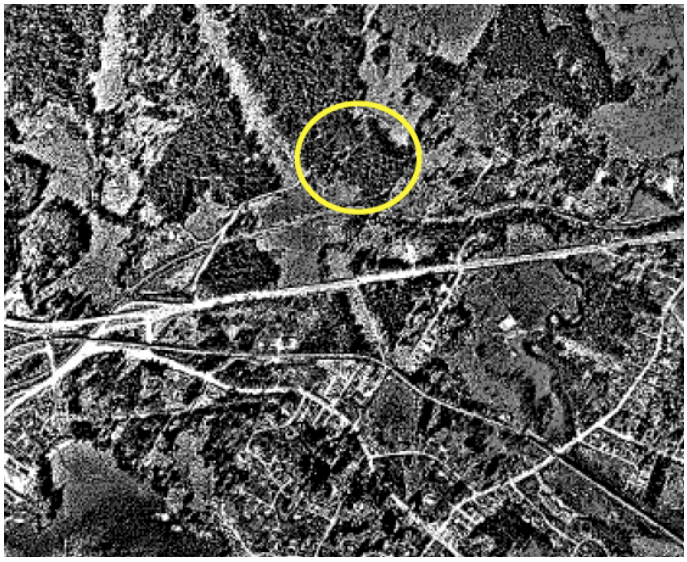
Earliest records of possible anthropogenic disturbance by fire on southern Vancouver Island occur in the early-Holocene (ca. 10,000-7,000 ybp), which continue through a climatic moistening period (ca. 7,000 to 2,000 ybp), and then substantially increased at 2,000 ybp to present (Brown and Hebda, 2002). This indicates there was a large population of coastal peoples occupying southern Vancouver island when the settlers arrived in the early 1800s, who had a long tradition of managing the land by fire, even when the climate was moistening and cooling (Brown and Hebda, 2002; McCune et. al. 2013). Traditionally first nations would burn Garry oak meadow woodlands in the late summer / early fall to encourage Camas growth (native lily with a potato-like root bulb which was a staple of coastal first nations diets) the following year but also to increase grazing areas for wildlife (another food source). These low-intensity ground fires would also prevent conifers, grasses and shrubs from colonizing the meadow woodlands and overwhelming evidence suggests these ecosystems are dependent on fire for their open structure (Pellatt and Gedalof, 2014). Upon arrival of the Europeans land ownership changed and traditional land management practices were unable to be realized. Douglas-fir recruitment has been continuous since around that time, and has also seen the introduction of numerous exotic invasive species.

2.6 Air Photo Monitoring

The project site and surrounding landscape has been drastically altered in the last decade. Refer to *Figure 9 (below, see next page for description)* for air photos and satellite photography through time. Although the surrounding area underwent development the location of the study site remained relatively untouched until 2010 when the first sold lot was cleared for development (Figure D in Cell 1). By 2011 an apartment building was constructed in that lot in the north-west corner of the park. The second lot (south-east corner) was cleared in 2014, and by 2015/2016 another, larger apartment complex had gone up in its place.

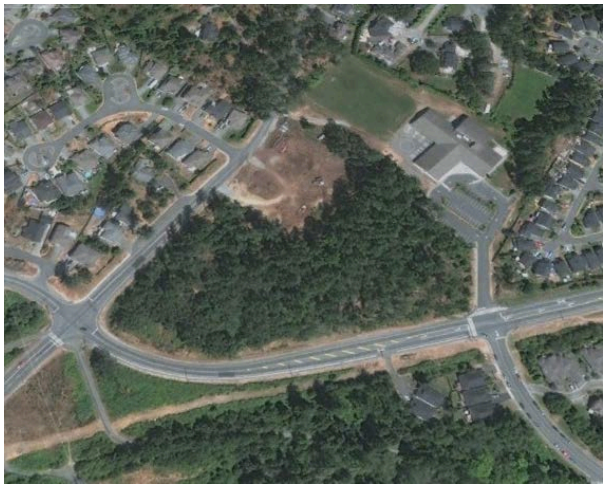


(A)

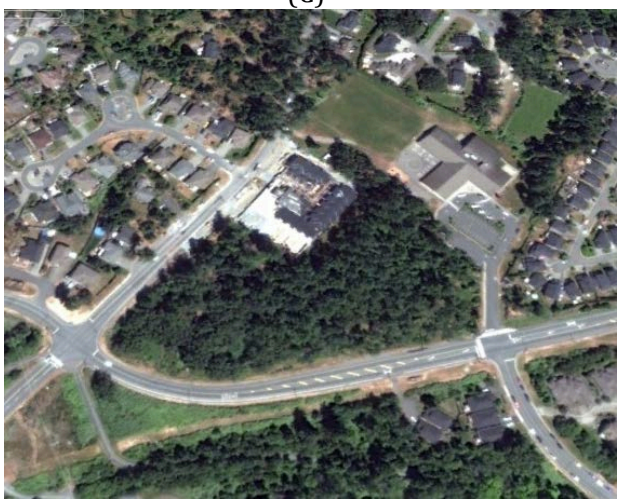


(B)

(C)



(D)



(E)

(F)

(G)

(H)

Figure 9. Air Photos and Satellite Imagery from 1933 to 2016 at Burnside Corner Park. (A) 1933, (B) 1968, (C) October 25, 2003, (D) July 26, 2010, (E) July 4, 2011, (F) November 29, 2014, (G) October 14, 2015, and (H) March 31, 2016. *(Air photos (A), and (B) courtesy of Evans, 2011 (UVic Air Photo Library), and satellite photos (C) through (H) courtesy of GoogleEarth)*

2.6.1 Habitat Loss

Pre-development the park encompassed 20, 942 m^2 of pristine mature Garry Oak and Douglas-fir forest. Since 2010 two large sections of the park have been completely cleared and higher-scale apartment buildings erected in their place. The vegetation in lot 'C' (as shown in Figure 7) remains a part of the functioning ecosystem until it too is cleared for development. Habitat loss at the site was 22.9% in 2010 with the first apartment building, increased to 53% in 2014 (to present) with the second apartment development, and will reach 64.9% when lot 'C' is cleared. Currently only 47% of the original patch is left and following the clearance of lot 'C' that number will be reduced to only 35.1% of the original lot. The substantial loss of habitat has placed additional stress on wildlife who live at/around the park, has increased edge effects along margins, and has given invasive vegetation more opportunities to colonize.

3.0 OBJECTIVES AND DELIVERABLES

The objectives of this project are to complete:

- Appropriate background research,
- Tree mensuration data collection,
- Wilderness tree assessment,
- Detailed terrestrial ecological mapping,
- Invasive species mapping/monitoring,
- Invasive species removal and follow-up mapping,
- Ecological Restoration In Progress sand-which board signs for future pulls,
- Photo Point Monitoring

Deliverables are:

- This report and appendices, and
- (2) x Sand-which board interpretive signs (to View Royal Parks Department)

4.0 METHODOLOGY

4.1 Data Sources and Background Research

Data sources were derived from scholarly journal article databases (accessed from the University of Victoria), government databases and restoration specialists (i.e. GOERT, Garry Oak Ecosystems Recovery Team). Background research was aimed at understanding the plant associations found on the site and providing a foundation for understanding the ecological interactions at work.

4.2 Location/Orientation Data Acquisition

All location data was recorded with a Garmin GPSMap60Cx on the World Geodetic System of 1984 (WGS84) datum and transferred to a MacBook with MacGPSPro. Data was recorded using WGS84 for compatibility with Google Earth. Typical accuracy range was within 2-3 m. A Brunton compass was used for all orientation measurements (slope, aspect, strike/dip of glacial features). Magnetic

declination was set to 17° for the project site; this number was found using the Magnetic declination calculator from Geomagnetism Canada through the Natural Resources Canada's website (www.geomag.ncrcan.gc.ca).

4.3 Field Work

Field work took place through July and early August of 2016 and was documented in a waterproof pocket field book and several sheets of paper for maps, tables and site visit forms *(found in Appendix X. Field Notes).* Care was taken in the field to not disturb the ground, groundcover and vegetation; or to do so as little as absolutely possible. Deer trails were taken when off the main trail, and steps were chosen carefully (i.e. on logs, bare rock/soil, branches etc.) to avoid trampling and compaction.

4.4 Tree Mensuration

Location, species, and diameter at breast height (dbh) were measured for all the trees remaining in the park. A Lufkin 6.5 m C106TPM was used for measuring diameter at breast height in meters, in some cases when exactly breast height could not be reached the measurement was taken at the closest appropriate level (i.e. trunk branching along ground, multiple trees from same base). Other information recorded was decay *(please see Appendix B. Tree Decay Guide),* notes about the crown/bark, mosses/lichens, wildlife use, and if Hedera Helix was close by or climbing. Each tree was also marked on a field map to see species distributions and also keep in check (along with GPS) which trees had been previously measured. Field methods and formulas for basal area calculations were found in Schaefer (2015).

4.5 Species Identification

Species were either identified based on previous knowledge, or a sample/notes/photograph was taken and investigated. References included Pojar and MacKinnon (1994), and several online sources including GOERT (2016) and Google Image searches. Graminoids were particularly challenging to identify and many samples were taken. Grasses were determined based on habit, inflorescence, spikelet, lemmas, awns and glumes. Refer to *Appendix C* for a cell showing all grasses collected and identified at the study site. This was used as a guide to help with mapping the ecosystems and determining plant associations.

4.6 Terrestrial Ecosystem Mapping

Ecosystem mapping was done in accordance to the Field Manual for Describing Terrestrial Ecosystems for the Vancouver Island Forest Region included in the course pack prepared by Hebda (2015) and found in GOERT (2011). For representative ecosystem units a soil pit was dug and a Site Visit Form was filled out. Information gathered for the Site Visit Form include location, elevation, SMR, SNR, site series, slope, aspect, surface shape, slope position, stand attributes, humus information, soil information, and vegetation species lists with percent cover. The final map of ecosystem units was compiled from field notes, field maps, GPS points, satellite images (which showed seasonality), and Site Visit Forms from the study area.

4.7 Invasive Species Mapping

Invasive species were mapped in detail in the north-east zones of the park (1, 2, and 3) and noted whenever observed in the larger zone 4. Notes included species types, locations, percent covers, habit, distribution and if it was producing berries/seed. Typically large patches were drawn by hand on working field maps and single individuals and smaller patch point locations were taken with GPS. The final map was compiled from all the field maps, field notes and GPS points acquired during fieldwork.

4.8 Invasive Species Removal

Zones for removal were chosen based on isolation, patch size, and proximity to the current trail system. The park can be divided up into four isolated patches *(as shown in Figure 6, page 6)* with three smaller zones in the north-east (1 through 3) and the largest zone in the south-west (4). Barriers for zones 1, 2, and 3 include the gravel trail system through the north end of the park, the apartment buildings, schoolyard fence, and Burnside Road. The barriers for zone 4 include the gravel trail in the north, the eastern apartment complex's parking lot, Watkiss Way, and Burnside Road.

4.8.1 Determination of Removal Zones

Zones 1, 2, and 3 were chosen for *Daphne laureola* removal as they are smaller isolated patches and full removal from these sites appeared to be a possibility. These sites are also all relatively close to the gravel trail system in the park which will cause for less trampling of groundcover and soil compaction during removal, and will also make it more manageable to haul the tarps from the removal sites to the pick-up location at the trail head. It was especially important to remove Daphne from the north-east edge along the fence boundary to the school to minimize potential harmful interactions with youngsters. It was also to get as much as possible along the gravel trail system to minimize potential negative pet and human encounters with the plants but also to prevent spread of the plant.

4.8.2 Organization of Work Party

The work party was organized with Jenny Hebb of the View Royal Parks department (and also a Restoration of Natural Systems graduate) for Sunday, July 24th, 2016. She was gracious to encourage the Portage Park volunteers to attend the Burnside Corner Park work party. The author rallied some friends and outdoor enthusiasts to also come help with the pull. Potential volunteers were contacted through phone or e-mail with reasonable success although the author has added a short section on other creative ways to promote these valuable events. The author supplied water and pop on ice in a cooler and Jenny supplied a plethora of delicious snacks for the volunteers. Jenny was in contact with Chris Garrett from View Royal Parks to bring a fold-out table (for snacks etc.), clippers, loppers, work gloves, and tarps to the work party, and also scheduled a pick-up and disposal of the noxious plants for the next day, Monday July 25th, 2016. Volunteers were also advised to wear long pants (& shirts if possible) to avoid any skin contact with the plant.

4.8.3 Best Management Practices

According to GOERT's Best Practices for Invasive Species Removal, the best time to remove younger *Daphne laureola* is when the soil is moist (so they can be hand-pulled) and larger patches and mature plants is mid-summer *(refer to Appendix D for Best Practices).* To kill the medium to larger sized plants (diameter pencil size and larger) we used loppers or clippers to cut below the stem line under the soil. This line is marked by an orange root color and they were cut under the soil to minimize soil disturbance. The smaller plants were hand-pulled and some of the larger ones could also be hand-pulled as well depending on the location, substrate, and previous disturbance.

4.8.4 Work Party

The work party took place on Sunday, July 24th of 2016 from 10 am to 1 pm PST. We all assembled at the site around 10 am, had introductions and filled out waiver forms for the city of View Royal that Jenny Hebb had brought for all the volunteers. The author gave a brief overview of the site and stressed the importance of invasive species removal in these endangered and rare ecosystems. A map was shown with the zones for removal (1, 2 and 3) and reasoning behind that choice (isolated). Then the print-out copy of GOERT's Best Practices for management of *Daphne laureola* was passed around and the author explained removal techniques, emphasizing how to minimize soil disturbance while maximizing eradication success. The plants poisonous nature was explained and each volunteer was suited with work gloves and loppers. Then the work party was broken into three teams, each team going to one of the three zones for removal. A tarp was taken to each area where removal was taking place for the cut/pulled plants, for ease of removal and also so berries and other parts of the plant wouldn't fall off onto the bare path. Around 12:45 pm clean-up began and the tarps were hauled to the front entrance to the park. The volunteers enjoyed some cool drinks and the pile of debris was left on site for pick-up/disposal by the city of View Royal the next day.

4.8.5 Follow-up Removal

Numerous follow-up pulls were completed by the author following the work party in effort to reach the goal of full removal of Daphne laureola from zones 1, 2, and 3. Care was taken to minimize disturbance while getting as much of the root system as possible. A bright red safety vest was worn and cut/pulled plants were removed by a tarp. Areas were went over multiple times to ensure no smaller plants or seedlings were missed.

4.9 Interpretive Signs

One of the recommendations in the Burnside Corner Park Management Plan (Evans, 2011) is to make interpretive signage. The sandwich board sign was an idea to encourage understanding and participation in invasive species removal. Throughout the project the author was approached by many residents and who what was taking place and someone even called in the work party in to the parks department as they thought we were a group of homeless people preparing to set up camp *(more interactions with residents in section 5.12).* A interpretive sign was designed using photos from the site, Adobe Photoshop CS4 and Adobe Illustrator CS6 at dimensions of 18" x 24" *(see Appendix E for interpretive sign design)*. This design was then printed out onto 4 sheets of 11" x 17" paper at ZAP

Copy at the University of Victoria, and then the white edges were cut off at home using scissors and a standard small paper cutter.

4.9.1 Sign Construction

A sheet of 5/8" plywood was able to be re-purposed, and was cut down to four sheets each sized ~ 20" x 26". Four 6' 1"x4" were purchased and cut down to 8 x 32" long pieces for the legs of the sign. The author is thankful for the gentleman in the Home Depot lumber department for making all these cuts. Hinges and screws were also purchased. The sheets were attached to the legs using five 1" wood screws per leg. The hinges were attached using three 5/8" wood screws per leg. With legs and hinges attached the boards were lightly sanded around the edges.

4.9.2 Final Touches

Spots of Dap (hole filler for painting) were used over screw holes, knots and markings in the wood to even out the sign surface. After allowing appropriate time to dry, the Dap was sanded smooth and the whole sign was gone over again to ensure no sharp edges. Then the dust was wiped off the sign using a damp cloth. After drying the legs were taped off and the sign surfaces were spray painted a light brown color (two coats) to make the surface more even and give it a polished look. After allowing time for the paint to dry/cure, the printed sheets with the sign design were wheat pasted to the painted surfaces. The wheat paste was made with water, white flour, and white sugar; and is an amazingly resilient glue that is completely biodegradable. The wheat paste mix was made by boiling 2 cups of water, then adding a cool flour-water mixture (6 tablespoons of flour, 20 teaspoons of cold water) to that and boiling for two minutes while stirring. After the two minutes the mixture is taken off heat and several tablespoons of white sugar are added and mixed in. Then the mixture is then poured through a strainer to catch any larger bits of flour that didn't get broken up. The strained product is then put in the fridge to cool. Once the paste is room temperature it is usable and will be fresh for about two days before starting to go bad. Once on a surface and hardened it can last a remarkably long time, but is also easily removed with warm water. For the restoration signs, an extra layer of wheat paste was applied over the first hardened layer to add resilience to the sign but it is suggested that extra large pillowcases are found to use as protective sleeves during transport.

4.10 Photo Point Monitoring

Photo point monitoring sites were chosen to be easily located and repeatable. All the monitoring sites are along the gravel trails, or a few steps in, and were marked on a working map of the trails (including an arrow in the direction that the photograph was taken). Each photo point location was also collected using GPS. A suite of photographs was acquired before the removal on July 24, 2016, and then after all the removals had taken place on August 8, 2016.

4.11 Map Products

Maps were made using a variety of software. First the data was organized into excel files for conversion to .kml (file type used by Google Earth). Then the formatted excel file was converted to

.kml using Earth Point's online conversion tool at https://www.earthpoint.us/ExcelToKml.aspx. The .kml file(s) were then opened in Google Earth. When the project site was at an appropriate scale (almost filling the screen) the data layers were added and images were acquired using the Google Earth save as image option. From there the images were opened with Adobe Photoshop where names, polygons, boundaries etc. were added along with a North arrow and scale.

5.0 RESULTS AND DISCUSSION

5.1 Species List

A total of 36 native, and 37 exotic plant species were identified at Burnside Corner Park during fieldwork. Also identified were 4 fungi, 5 invertebrates and 9 vertebrate species present at the study site. Full species list below, species marked with an asterisk * are exotic and invasive.

Plant species

- Trees
  - *Quercus garryana* (Garry Oak)
  - *Psuedo-tsuga menziesii* (Douglas-fir)
  - *Abies grandis* (Grand Fir)
  - *Acer macrophyllum* (Big-Leaf Maple)
  - *Malus fusca* (Pacific Crab Apple)
  - *Malus pumila** (Apple)
  - *Prunus cerasifera** (Cherry Plum)
  - *Pyrus communis** (European Pear)
- Small Trees
  - *Rhamnus purshiana* (Cascara)
  - *Crataegus douglasii* (Black Hawthorn)
  - *Crataegus laevigata** (English Hawthorn)
- Shrubs
  - *Amelanchier alnifolia* (Saskatoon)
  - *Oenleria cerasiformis* (Indian Plum)
  - *Symphoricarpos albus* (Snowberry)
  - *Cornus stolonifera* (Red-Osier Dogwood)
  - *Holodiscus discolor* (Oceanspray)
  - *Mahonia nervosa* (Dull Oregon-Grape)
  - *Mahonia aquifolium* (Tall Oregon-Grape)
  - *Rosa nutkana* (Nootka Rose)
  - *Rosa gymnocarpa* (Bald-hip Rose)
  - *Lonicera hispidula* (Hairy Honeysuckle)
  - *Lonicera ciliosa* (Western Trumpet Honeysuckle)
  - *Gaultheria shallon* (Salal)
  - *Pteridium* (Bracken Fern)
  - *Polystichum munitum* (Sword Fern)
  - *Polypodium glycyrrhiza* (Licorice Fern)
  - *Rubus ursinus* (Trailing Blackberry)
  - *Rubus laciniatus** (Cut-Leaved Blackberry)

*Rubus discolor** (Himalayan Blackberry)
*Daphne laureola** (Spurge-Laurel)
*Ilex aquifolium** (English Holly)
*Cytisus scoparius** (Scotch Broom)
*Hedera helix** (English Ivy)
*Solanum dulcana** (Bittersweet Nightshade)

Grasses

Elymus glaucus (Blue Wildrye)
Bromus Carinatus (California Brome)
Melica subulata (Alaska Oniongrass)
*Dactylis glomerata** (Orchardgrass)
*Arrhenatherum elatius** (Tall Oat-Grass)
*Festuca ovina** (Sheep Fescue)
*Festuca arundinacea** (Tall Fescue)
*Anthoxanthum odoratum** (Sweet Vernalgrass)
*Anthoxanthum aristatum** (Annual Vernalgrass)
Anthoxanthum spp.* (Small Spiked Vernalgrass)
*Agrostis capillaries** (Colonial Bentgrass)
*Agrostis stolonifera** (Creeping Bentgrass)
*Bromus pubescens** (Downy Brome)
*Bromus hordaeceus** (Soft Brome)
*Bromus tectorum** (Cheatgrass)
*Bromus sterilis** (Barren Brome)

Forbs

Sedum spathulifolium (Broad-Leaved Stonecrop)
Trientalis borealis ssp. latifolia (Broad-Leaved Starflower)
*Geranium robertianum** (Herb Robert, Stinky Bob)
*Lactuca muralis** (Wall Lettuce)
*Galium aparine** (Cleavers)
*Cirsium arvense** (Canada Thistle)
*Cirsium vulgare** (Bull Thistle)
*Hypochaeris glabra** (Smooth Cat's Ear)
*Hypochaeris radicata** (Hairy Cat's Ear)
*Silene coronaria** (Rose Champion)
*Hypericum perforatum** (St. John's Wort)
*Lamium amplexicaule** (Common Dead-Nettle)
*Lamium purpureum** (Purple Dead-Nettle)
*Daucus carota** (Queen Anne's Lace)
*Mentha** (Mint)

Mosses

Rhytidiadelphus triquetrus (Electrified Cat's Tail Moss)
Dicranum scoparium (Broom Moss)
Kindbergia oregana (Oregon Beaked Moss)
Racomitrium canescens (Grey Rock Moss, aka Hoary Fringe-moss)
Selaginella wallacei (Wallace's Spikemoss)

Lichens

Lepraria spp. (Dust Lichen)

Alectoria sarmentosa (Witch's Hair)
Lobaria pulmonaria (Lungwort)

Fungi

Trametes versicolor (Turky Tail Fungus)
Ganoderma zonatum (White Bracket Fungi)
Basidiomycota (Brown Bracket Fungi)
Mycorrhizae (White Mycorrhizael Fungi)

Invertebrates

Insects

Camponotus spp. (Carpenter Ants)
Isoptera (Woodlice)
Cynipidae (Gall Wasp)

Butterflies

Ochlodes sylvanoides (Woodland Skipper)
*Pieris rapae** (Cabbage White)

Vertebrates

Reptiles

Podarcis muralis (European Wall Lizard)

Birds

Haliaeetus leucocephalus (Bald Eagle)
Sphyrapicus ruber (Red-Breasted Sapsucker)
Poecile atricapillus (Black-Capped Chickadee)
Junco hyemalis (Dark-Eyed Junco)
Selasphorus rufus (Rufous Hummingbird)
Turdus migratorius (American Robin)

Mammals

Odocoileus hemionus columbianus (Black-Tailed Deer)
Sylvilagus floridanus (Eastern Cottontail Rabbit)

5.2 Tree Study

A total of 735 trees were identified within the study site *(refer to Figure 10, next).* There were 11 species in total, 7 native and 4 exotic. Native species were (in order of decreasing abundance) Garry Oak *(Quercus garryana),* Douglas-fir *(Psuedo-tsuga menziesii)*, Black Hawthorn *(Crataegus douglasii)*, Grand Fir *(Abies grandis)*, Big Leaf Maple *(Acer macrophyllum),* Cascara *(Rhamnus purshiana),* and Pacific Crab Apple *(Malus fusca).* Exotic trees (in order of decreasing abundance) are common Apple *(Malus pumila)*, English Hawthorn *(Crataegus laevigata),* Cherry *Plum (Prunus cerasifera),* and European Pear *(Pyrus communis).* Although there are many more Garry Oak trees than any other species, Douglas-Fir makes up a much larger total basal area of the park due to the size and habit of the species. The largest tree is a Douglas Fir with a dbh of 4.3 meters, located at 467189 mE and 5368109 mN. The largest Garry Oak tree is located at 467100 mE and 5368057 mN and has a dbh of 3.854 meters. There are 136 Douglas-Fir, 43 Garry Oak, 6 Grand Fir, and 1 Plum tree with a dbh greater than one meter in the study site. Refer to *Table 2 (next)* for tree information, *Appendix F* for a

spreadsheet with all of the tree data collected, and *Appendix G* for larger .pdf versions of the map made for Figure 10 and the Terrestrial Ecosystems and Invasive Species maps to follow.

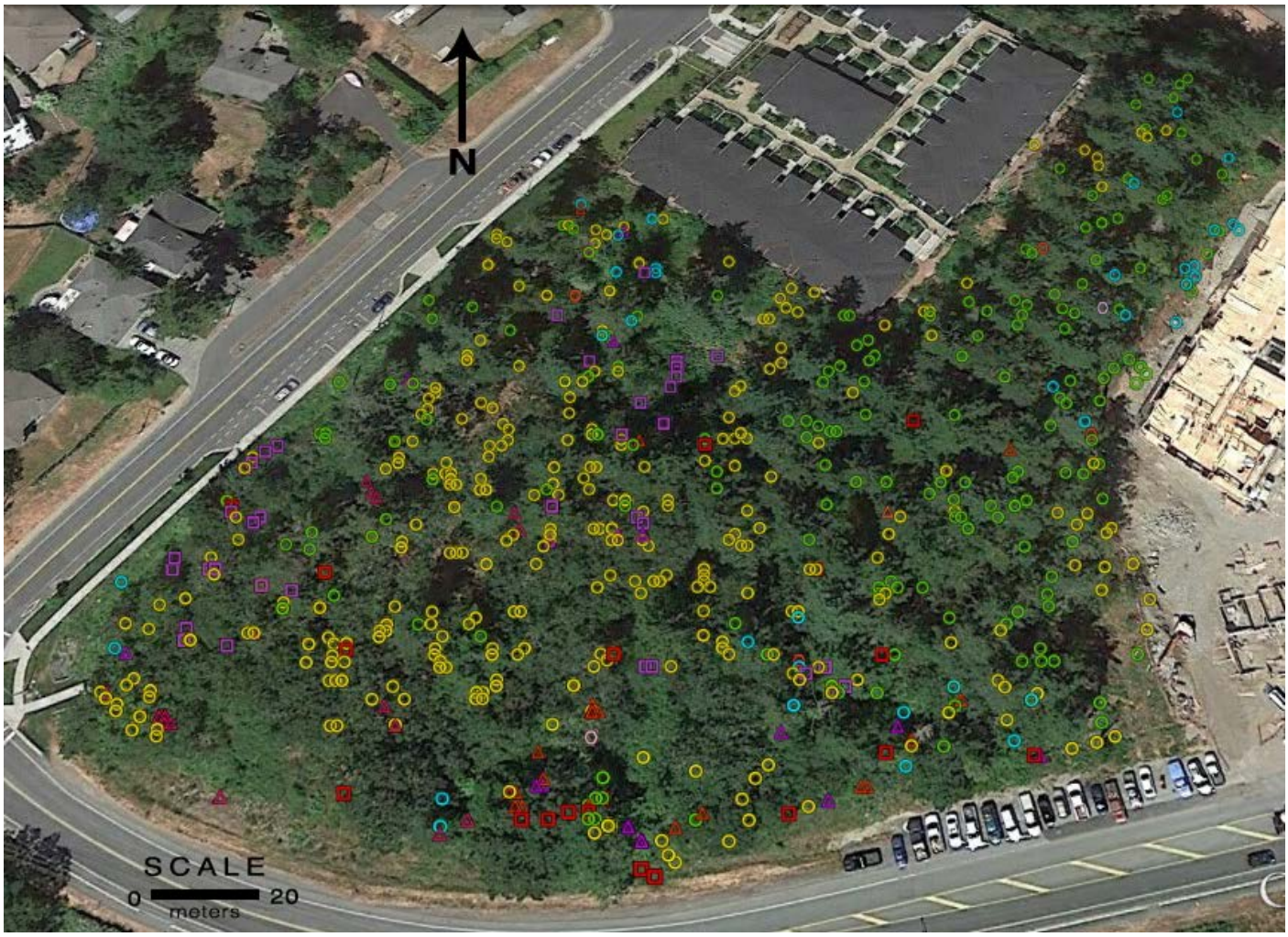


Figure 10. Distribution of all trees at Burnside Corner Park. Circles: yellow – Garry Oak, green – Douglas-fir, blue – Grand Fir. Boxes: purple – Black Hawthorn, red – English Hawthorn. Octagons: lavender – Cascara, orange – Big Leaf Maple. Triangles: dark orange – Apple, light orange – Pacific Crab Apple, purple – European Pear, and fuchsia – Cherry Plum. (Satellite image courtesy of GoogleEarth, acquired on June 7th, 2015 – this same satellite image was used for all tree distribution maps to follow in the report.)

Species Name	Common Name	No. of trees	Basal Area (m^2)	Trees > 1 m dbh	% with decay	% infested with H. Helix
Garry Oak	*Quercus garryana*	371	154.18	43	18%	1%
Douglas Fir	*Psuedo-tsuga menziesii*	189	546.02	136	28%	2%
Black Hawthorn	*Crataegus douglasii*	43	1.83		23%	
Grand Fir	*Abies grandis*	39	19.04	6	18%	2.60%
Common Apple	*Malus pumila*	22	1.03		27%	
English Hawthorn	*Crataegus laevigata*	21	0.37		5%	
Cherry Plum	*Prunus cerasifera*	21	2.28	1	43%	
European Pear	*Pyrus communis*	19	4.88		0%	
Big-Leaf Maple	*Acer macrophyllum*	4	0.21		0%	
Cascara	*Rhamnus purshiana*	3	0.05		33%	
Pacific Crab Apple	*Malus fusca*	1	0.05		0%	

Table 2. Tree data collected and calculated for Burnside Corner Park, July 2016.

The % with decay in *Table 2* is the total number of trees with visual appearance code less than 1 (which is perfectly healthy), divided by the amount of the healthy population (visual appearance code of 1) and multiplied by 100 for percent. Although trees that show decay are not 100% healthy most of them are still living to some extent. See *Figure 11 below* for a map that shows the distribution of trees with varying levels of decay.

Figure 11. Trees showing decay > 1 at Burnside Corner Park. Darkening shades of red represent increased decay and the shapes are representative of species with circles and octagons being native tree species, boxes are Hawthorn, and triangles represent fruit trees. In order of increasing decay; white – 2: unhealthy, internal growth or decay, broken top, dying tree; pink – 3: fine twigs or needles/leaves present; light orange – 4 to 5: no needles or fine twigs, most branches and mark missing; dark orange – 7 to 8: half to one-third of original height, extensive internal decay; deep maroon – 9: downed trees or stumps, windfall. Decay values correspond to the Visual Appearance codes for wildlife trees in *Appendix B. (B.C., 2010).*

Hedera Helix was present at the study site and has vined up *Psuedo-tsuga menziesii, Quercus garryana,* and *Abies grandis*. Please see *Figure 12 (next page)* for a bar graph comparing the percent of decay for each species, and percent of that species population invested with *Hedera Helix*. More on English Ivy infested trees in *section 5.2.7*.

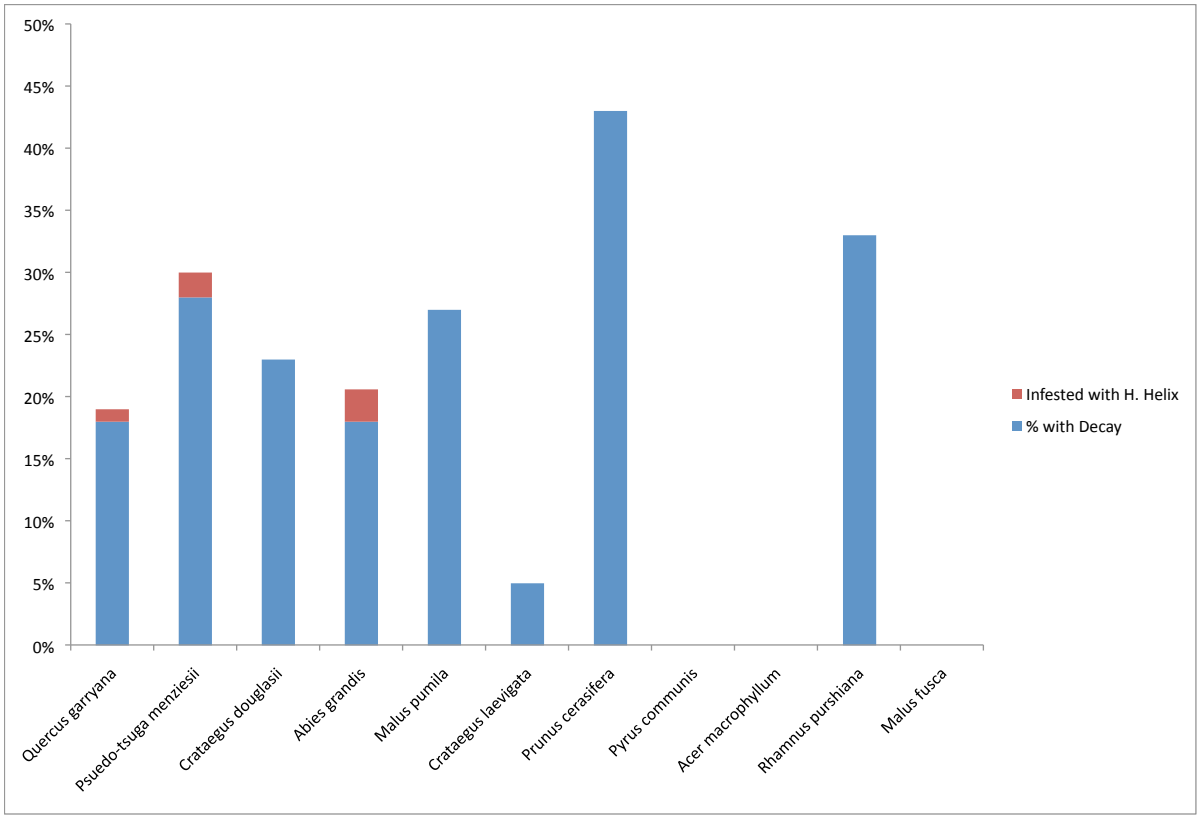
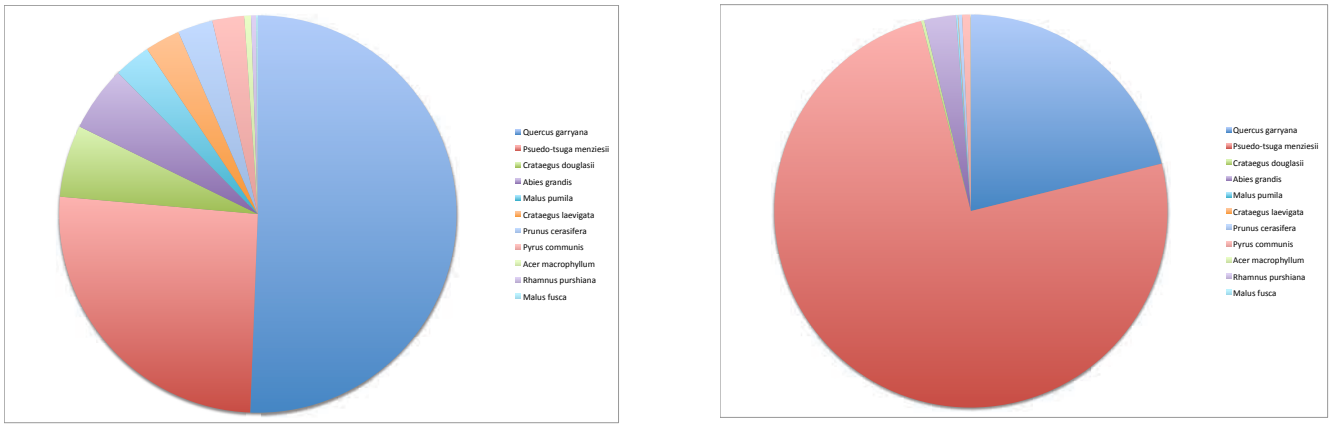


Figure 12. Percent of population with decay (y-axis, blue bars) for tree species at Burnside Corner Park. Percent of each species population infested with *Hedera Helix* shown in red.

5.2.1 Comparison of Tree Species

Tree species are made up of native deciduous and coniferous trees, exotic fruit trees, and Black and English Hawthorn. The Hawthorns, although typically classified as shrubs were included in the tree study due to size of trunk typically > 0.01 dbh, and their distribution was clustered indicating they preferred a certain type of habitat. Cascara *(Rhamnus purshiana)* is also typically classified as a shrub but since it always showed habit of a small tree, was also included in the tree study. The most dominant in terms of sheer number of trees is *Quercus garryana*, with 371 trees total making up 50.5% of all the trees present on the site with a total basal area of 154.18 m^2 (~1% of the total park). In terms of basal area however, *Psuedo-tsuga menziesii* takes up the most space with a total basal area of 546.02 m^2, which is approximately 4% of the entire park. See *Figure 13 (next page)* for a graphical representation of tree distribution and total basal area for all of the tree species present.



(A) (B)

Figure 13. Comparison of tree species by: (A) total number of individuals, and (B) total basal area of each population.

5.2.2 Native Tree Distribution

Healthy and un-healthy native trees were plotted over satellite imagery and can be seen in *Figure 14 (next page)*. The majority of the trees show no signs of decay. *Quercus garryana* forms three main clusters of healthy trees, a large one (hundreds of trees) over most of the map area in the central-west, a smaller one (~10 trees) at the eastern edge of the south-east development, and a very small patch (3 trees) in the north-east corridor. This distribution corresponds with a preference for rocky outcrop and shallow soils. *Psuedo-tsuga menziesii* is mostly clustered in the east of zone 4 and through the north-east corridor, but there is also a small patch along the western edge and individuals are scattered throughout. This distribution follows the deeper soils at the project site, sporadically around outcrops and increasing with distance from the outcrops. Many of the Douglas-Fir trees branches have been cleared to 15 + meters, especially near the trail and along the park edges. This is likely done to prevent blowdown, and also as a fire safety tool to prevent potential ground fires from crowning. *Abies grandis* typically grows proximal to Douglas-Fir in slightly deeper soils. Black Hawthorn *(Crataegus douglasii)* grows in the dampest spots at the site, in gulleys and valley areas prone to flooding. The black berries from these trees are edible, and thorns were used to perform a variety of tasks such as piercing ears and for fish hooks, the bark is also medicinal and was traditionally used to thin the blood, treat venereal disease, reduce swellings, or strengthen the heart (Pojar and MacKinnon, 1994). Cascara *(Rhamnus purshiana)* and Big-Leaf Maple *(Acer macrophyllum)* were few and apparently sporadic but did share associations with other tree species. *Rhamnus purshiana* was always noted in *Psuedo-tsuga menziesii* dominated sections of forest and *Acer macrophyllum* in *Quercus garryana*-dominated. Both of these trees provided a traditional food source, berries from *Rhamnus p.* and flowers from *Acer m.* The bark of *Rhamnus purshiana* was also boiled by coastal peoples and drunken as a strong laxative, which has also been proven scientifically (Pojar and MacKinnon, 1994). Another important food source for coastal peoples was *Malus fusca* (Pacific Crab Apple), which was identified in the eastern portion of zone 4. *Malus fuscais the* only native fruit tree at BCP and it is healthily growing (with numerous fruit-filled branches) in a relatively open section of mixed Garry Oak –

Douglas-fir forest. From its placement on the map it looks like it will unfortunately be cleared for the future development of lot 'C'.

(A) (B)

Figure 14. Distribution of native trees. Circles: yellow – Garry Oak, green – Douglas-fir, blue – Grand Fir. Purple boxes – Black Hawthorn. Octagons: lavender – Cascara, orange – Big Leaf Maple. Triangle: light orange – Pacific Crab Apple. (A) Healthy individuals, (B) individuals showing decay > 1.

Unhealthy trees appear to have uniform distribution on the map but the majority of them are close to the borders of the park, or near the newly constructed trail. This points to edge effects as being a major stress on young to mature native tree health. Edge effects at the park include: increased solar radiation and dryness along new edges (apartment buildings), wind-throw at western forest edge of zone 4, and susceptibility to invasive species and pollution (along roads and trails). The relative abundance of *Quercus garryana* showing decay in the central region of the park is likely due to the tall Douglas-fir canopy shading out the Garry Oak canopy which is quite a bit lower in the woodland meadow. This phenomenon, termed conifer encroachment, is consequence of the loss of traditional management for Garry Oak ecosystems *(more to follow in section 5.2.4).*

5.2.3 Tree Age Relationships

The diameter at breast height was taken for tree species to not only look at health and distribution but also for a mean analogy to tree age. A study by Dunwiddie et. al. (2011) looks at a mixed Garry Oak – Douglas-fir woodland traditionally managed by first peoples on Waldron Island in Washington State. In this study they draw relationships between dbh and age for *Quercus garryana* and *Psuedo-tsuga menziesii*, and due to the numerous similarities between the study site at Waldron Island and at Burnside Corner Park this chart is used throughout the report as a mean estimate of tree age based on dbh measurements for Garry Oak and Douglas-fir trees *(refer to Figure 15, next page).* The largest trees at BCP are beyond the limit of the graph indicating they could be 400 years old or older and are very likely true old growth.

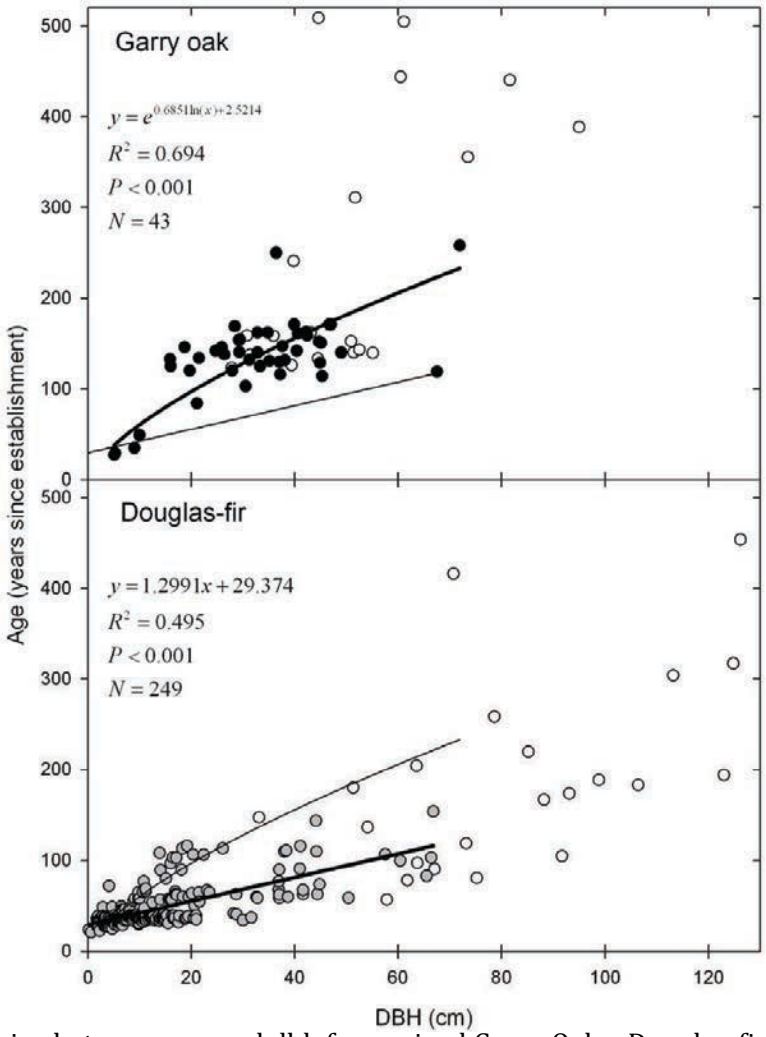


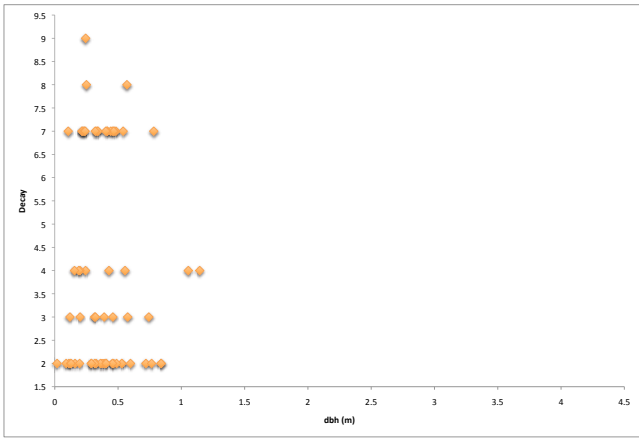
Figure 15. Relationships between age and dbh for a mixed Garry Oak – Douglas-fir woodland on Waldron Island, Washington. *(Image courtesy of Dunwiddie et. al., 2011)*

5.2.4 Native Tree Decay and History

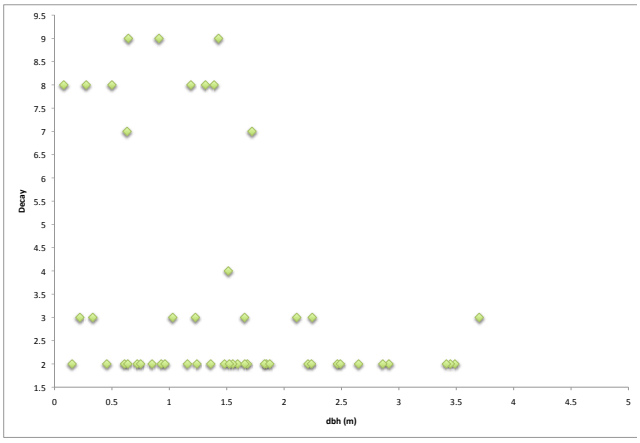
Diameter at breast height was plotted against decay for major tree species to see potential relationships between age of trees and death *(Figure 16, A through B, starts next page)*. *Quercus garryana* trees 0.01 to ~1.2 m showed decay, with most unhealthy individuals clustered around a dbh of 0.4 to 0.5 m. The older Garry Oak trees were all very healthy, but also reached the canopy height. Many of the 0.4 to 0.5 meter (100-150 years old) *Quercus garryana* that show decay are located within the mixed forest and over-shaded by *Psuedo-tsuga menziesii*. These trees are likely suffering from lack of sunlight caused by conifer encroachement. Conifer encroachment is a term used for when Douglas-fir trees are unmanaged in a Garry Oak ecosystem. Normally fir seedlings would not be able to get established due to periodic burning of the groundcover (although occasional larger Douglas-fir would survive as they have fire resistant bark) in the late fall by coastal peoples. This tradition likely took place over the study area for hundreds to thousands of years before the settlers arrived in the early 1800s. Upon their arrival the management of Garry Oak ecosystems by fire ceased and fir trees began to grow. Since Douglas-fir grows faster and taller than *Quercus garryana*, it quickly started to form an

upper canopy above the existing Garry Oak canopy. As the upper conifer canopy fills in the *Quercus garryana* are shaded out below. Since Garry Oak are shade in-tolerant, many of them start to suffer due to lack of sunlight. Many of the mature *Psuedo-tsuga menziesii* at the site are around 150 years old based on a dbh mean of 1.5 m. This indicates that at this site traditional fire management ceased around 1800 as well. The few trees larger than 1.5 m dbh were likely growing during very sporadically in the area managed by fire. The *Quercus garryana* trees dying in the 100-150 year old age range is likely because they started growing around the same time as the *Psuedo-tsuga menziesii* but were out-competed for sunlight. The developments and installation of the gravel path through the park has seen the removal of many of the ~150-250 year old Douglas-fir trees. These larger trees (dbh > 1 m) are also succeptable to wind-fall as their crown sways high in the canopy during strong winds. These winds would normally be moderated but due to un-natural sharp edges (roadways), the wind hits the park with greater force, evidenced by occasional windfall observed on the ground in the study site. Larger dbh Douglas-fir have also been targets for *Hedera helix* at the park which has contributed to decay and likely eventual death. The loss of these larger conifers has already opened up the park in terms of canopy cover. There are numerous oak seedlings in the eastern portion of the park, this could be due to increased sunlight coming in from the south eastern edge since the development of the second apartment building (north-east corner) and removal of large *Psuedo-tsuga menziesii* along its boundary. A study by Fuchs et. al. (1999) suggests that regardless of to which depth a Garry Oak seedling is buried, once the seedling emerges it has a success rate of 65% or higher in most habitats. One day Burnside Corner Park could be yet again the Garry Oak meadow woodland that it once was.

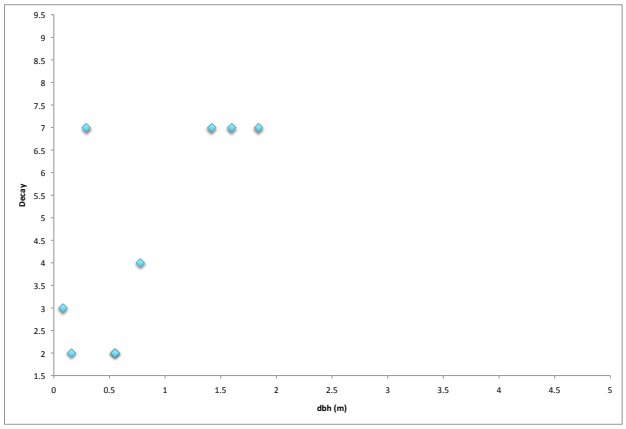
Grand Fir trees show decay in two clusters, one around 0.4 m dbh and one around 1.2 m dbh. It can be inferred that the larger dbh trees are dying due to stress of edge effects (road, apartments, trail) and possibly wind-fall as these are in the same upper canopy level as the Douglas-fir. The younger *Abies grandis* that show decay are typically found on dryer slopes and down-slope of the seasonal wet-depression. Their needles have turned red and they look very dry, likely consequence of the alterations in hydrology and possible loss of the ephemeral pool in the central gully of the park. Small trees didn't show any specific age correlation to decay, and there were unhealthy individuals of all sizes (ages). This indicates it could likely be due to lack of moisture in areas, also possibly linked to the changes in the hydrology and ground water table at the study site.

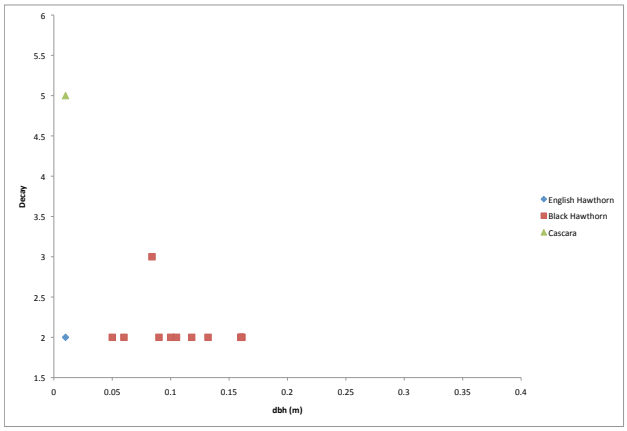


(A) *Quercus garryana* (Garry Oak)



(B) *Psuedo-tsuga menziesii* (Douglas-fir)





(C) *Abies grandis* (Grand Fir)

(D) Small Trees

Figure 16. Native tree dbh plotted against decay. Only trees that showed decay (> 1) were plotted on the graphs. (A) Garry Oak *(Quercus garryana).* (B) Douglas-fir *(Psuedo-tsuga menziesii).* (C) Grand Fir *(Abies Grandis).* (D) Small Trees.

5.2.5 Exotic Tree Distribution

Exotic trees at Burnside Corner Park are fruit trees *Malus pumila*, *Prunus cerasifera*, and *Pyrus communis*, and ornamental species *Crataegus laevigata (see Figure 17)*. All of these trees are classified as invasive to Garry Oak ecosystems (GOERT, 2016). The majority of the trees form a dense population along the southern edge and this portion of the site was likely an orchard sometime in the late 1800's, early 1900's. A few trees are scattered close to densly compacted soils which could have been trails branching off from the orchard area at one time, or they may have been dropped there by animals or humans. The somewhat randomly placed exotic trees in the central area of the park were likely transferred there by natural dispersion from wildlife.

(A)

(B)

Figure 17. Distribution of Exotic Trees. Red boxes – English Hawthorn. Triangles: dark orange – common Apple, dark purple – European Pear, and fuchsia – Cherry Plum. (A) Healthy individuals, (B) individuals showing decay > 1.

Exotic tree species that show decay are very few and found across the park. The ones experiencing stress at the edges is likely caused by presence of introduced invasive species and other edge effects such as increased wind and solar radiation. *Malus pumila* showing decay close to the large gully is indicative of dryer conditions than usual, and there are also sporadic fruit trees and English Hawthorn that are experiencing decay down-slope from there which could be an effect of the altered hydrology of at the park due to the up-slope developments.

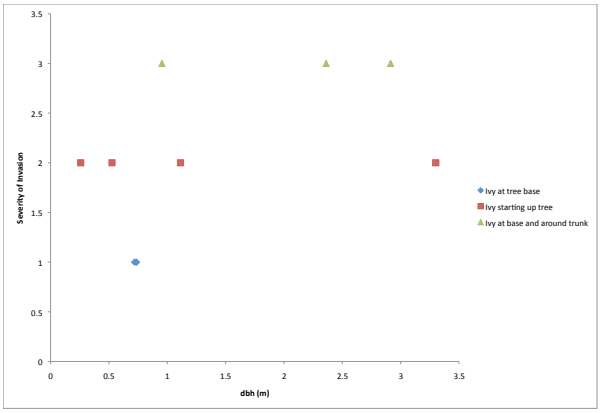
5.2.6 Exotic Tree Decay and Mensuration

Exotic tree species don't show any specific typical dbh of decay and are unhealthy individuals are found at all age ranges of the species. Decay is likely due to changes in hydrology and/or % canopy cove in different areas of the site.

5.2.7 Trees Infested with Hedera helix

All of the trees infested with *Hedera helix* are located either proximal to the trails or edge of the park (within 20 meters) with the exception of one *Quercus garryana* in the central-west area of zone 4 *(see Figure 18 for distribution map & dbh plot).* From the distribution of affected trees we can see the edge effects are not only having an influence on overall tree health, but also increasing ability of invasives to affect trees. Being close to a busy roadway is convenient for the invasive species that may be travelling on tires, shoes, paws etc. to fall into the area surrounding the park or along to the trails.

(A)



(B)

Figure 18. Trees infested with English Ivy *(Hedera Helix)* at Burnside Corner Park. (A) Distribution. Garry Oak are shown with yellow circles, Douglas-fir with green circles, and Grand Fir with blue circles. During the work party on June 24th, 2016, *Hedera helix* was removed from the trunk of a *Psuedo-tsuga menziesii* along the path close to the entrance of the park, and thus is the reason that previously infestated tree was not included on this map. (B) Severity of Hedera Helix infestation versus dbh. Severity of infestation is a scale created for the purposes of this report to present the data. 1 – English Ivy at tree base, 2 – English Ivy starting to climb, 3 – English Ivy established and climbing.

Severity of invasion was plotted against dbh to determine if there was any link between age of tree and degree of infestation. There was more severe invasions on trees with > 1 m dbh than ones with less indicating that the English Ivy prefers the larger trunk of conifers, in particular Douglas-fir. *Hedera helix* can really lodge itself into the bark cavities on *Psuedo-tsuga menziesii* making it an ideal candidate for takeover. Douglas-fir trunks are also usually quite shaded relatively compared to Garry Oak. Trees infected with *Hedera Helix* typically had drier tops, upper branches without needles, and looked like they were either dying or starting to die.

5.2.8 Mosses on Trees

Mosses were present on native and exotic trees. Increased moss growth on trees corresponds to increased canopy cover and trunk aspect (more growth on the shady side). Mosses preferred *Quercus garryana* to conifers *Psuedo-tsuga menziesii*, and *Abies grandis*, and in general to the other natives and exotics. Moss on the trees was typically Electrified Cat's Tail Moss *(Rhytidiadelphus triquetrus)* near the base and Broom Moss *(Dicranum scoparium)* further up the trunk. Occasional *Rhytidiadelphus* on branches in shadier areas.

5.2.9 Lichens on Trees

All Douglas-fir trees in the study site had light grayish dust lichen *(Lepraria spp.)* on their trunks. The habit was dusty to crusty and occasionally forming short (upto 10 mm) light grey clubs near their base. A dusty yellow lichen was typically observed on *Abies grandis*, and occasionally on *Psuedo-tsuga menziesii*. Common witch's hair *(Alectoria sarmentosa)* lichen occasional hangs from *Quercus garryana* in the open outcrop areas. In shadier areas with substantial canopy cover lungwort *(Lobaria pulmonaria)* grows on the sides of Garry Oak (rare), Common apple (sometimes), Cherry Plum (sometimes), and Black Hawthorn (often). Lungwort was historically used by the Sechelt people and early European physicians to treat pnumonia and other lung diseases (Pojar and Mackinnon, 1994).

5.2.10 Fungi on Trees

Fungi was relatively rare to see on trees at the project site but *Ganoderma zonatum* was noted on a Douglas-fir tree, Turky tail fungus *(Trametes versicolor)* on a few other, as well as occasional Bracket fungi *(Basidiomycota)*. Fungi was only present on trees showing some degree of decay and therefore could also be an indicator of tree health.

5.3 Wildlife Tree Assessment

Wildlife trees at the park are most often consequence to selective cutting (either at base of trunk or at 2-4 meters up) or wind-throw. The vast majority of wildlife trees at Burnside Corner Park are *Psuedo-tsuga menziesii.* Most cut stumps are along the park borders or along the gravel trail network. Windthrown trees are located along the south-western edge of the park and usually broken from 0.2 to 1 meter up the trunk. On the western edge of the park there are three Douglas-fir trees that have

been cut at around 4 meters height (likely to prevent blow-down) and one of them has a birdhouse carved in at the top! There is at least one totally gutted *Psuedo-tsuga menziesii*, likely due to work by the *Camponotus* relatively close by. Holes in trees range from 1 to 100 mm. Small 1-3 mm holes are rounded and likely caused a Red-Breasted Sapsucker. Holes 10-20 mm in size were likely caused by a Woodpecker. It is inferred that the large 100 mm holes were created by *Odocoileus hemionus columbianus* muzzling into the bark as the only tree this was noted on was a Douglas-fir close by to where the deer was most observed.

5.4 Coarse Woody Debris

Coarse woody debris (CWD) is fairly common throughout the park, although not numerous it takes up approximately 1% of the groundcover over the study site. This includes downed trees, branches, and bits of branches from trees and shrubs with varying levels of decay.

5.5 Terrestrial Ecosystem Mapping

Detailed terrestrial ecosystem mapping yielded fourteen individual ecosystem units within the study area *boundary (see Figure 19. Ecosystem Units of Burnside Corner Park, View Royal, BC, next page).* Six of these units were located on Garry Oak dominated sites, five on Douglas-fir dominated sites and three on disturbed sites. Crest slope positions on bedrock outcrops host endangered moss and herb communities, upper slopes are dominated by grasses and conifers. Mid-slope positions at the site are occupied by a stand of mixed Garry Oak – Douglas-fir, with higher concentration of Quercus garryana in the central-west and higher perchentage of Psuedo-tsuga menziesii and Abies grandis in the east. Lower and toe slope positions are occupied with dense multi-layer shrub thickets of Symphoricarpos albus (Snowberry) and Rosa nutkana (Nootka Rose). Moisture recieveing sites include a Cornus sericea (Red-Osier Dogwood) dominant area on the western edge, a Crataegus douglasii (Black Hawthorn) dominant area in the deepest gully on site which begins on the south side of the main trail and runs south-west into zone 4; and a Bracken Fern – Salal – Swordfern plant association in the convex area in the shadow of the large outcrop in the north-east corridor. Disturbed sites are the gravel trail network through the site, an area of partly cleared/compacted soil in the south-east corner adjacent to development, and a dry patch of exposed soil in the central part of zone 4 which has been termed the seasonal wet depression from previous reports (Evans, 2011). The map provides brief descriptions of the ecosystem units which are each fully described in the following sections.

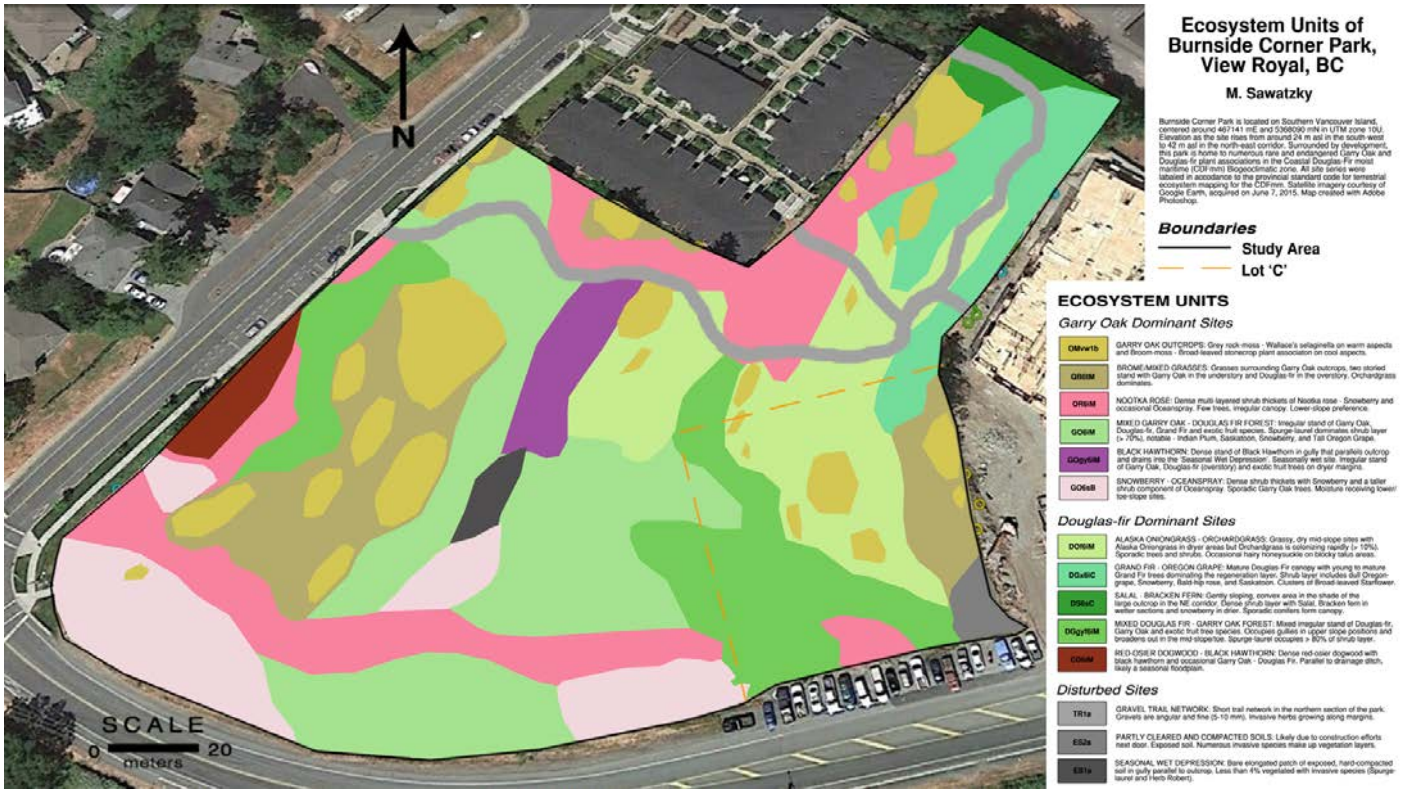


Figure 19. Ecosystem Units of Burnside Corner Park, View Royal, BC. Please refer to *Appendix G* for a much larger version of this map.

5.5.1 Garry Oak Outcrops (OMvw1b)

Garry Oak outcrop communities are distributed throughout the park with a concentration along the western edge proximal to the boundary. These very shallow sites exist on the glacially garbed north-east – south-west orientated landscape, and range in depth from one to a few centimeters and in area from 1 to 10s of meters squared. The plant communities are dominated by bryophytes and graminoids, and there are no trees or shrubs, although there is canopy cover of ~20% from nearby overhanging branches. The dryer tops of outcrops (south-facing warm aspect) have > 70% cover of mosses, 16% cover by grasses, and the remaining percent covered by native and invasive herbs. The warm aspect mosses include *Racomitrium canescens* (Grey Rock Moss), *Selaginella wallacei* (Wallace's Spikemoss), and minor *Dicranum scoparium* (Broom Moss). The predominant graminoid is *Dactylis glomerata* (Orchardgrass), and forbs include 6-10% *Sedum spathulifolium* (Broad-Leaved Stonecrop) and trace invasives *Geranium robertianum* (Herb Robert) and *Hypochaeris glabra* (Smooth Cat's Ear). The cooler, shaded aspects and sides of outcrops were dominantly *Dicranum scoparium* with minor *Rhytidiadelphs triquetrus* (Electrified Cat's Tail Moss) close to the ground and 40% + *Sedum spathulifolium* on rock faces. On these shaded sides of outcrops there was also occasional *Polypodium glycyrrhiza* (Licorice Fern) and invasive herb *Lactuca muralis* (Wall Lettuce) observed growing out of cracks in the bedrock. See *Figure 20, next page,* for a representative photograph of the Garry Oak Outcrops ecosystem unit (OMvw1b).

Figure 20. Garry Oak Outcrops ecosystem unit (OMvw1b), with Garry Oak dominated Brome/Mixed Grasses (QB6tM) between outcrops and mixed Garry Oak – Douglas-fir forest (GO6iM) in the distance. Photo looking South.

5.5.2 Brome/Mixed Grasses (QB6tM)

Grassy shallow sites surrounding Garry Oak outcrops. Soil depth is around 20 centimeters and is poorly sorted with 40% + coarse angular fragments of bedrock. Generally two-storied stands with sporadic *Psuedo-tsuga menziesii* forming a tall upper canopy layer, and *Quercus garryana* forming a lower canopy. These trees are likely growing in localized deeper areas within this unit. Shrubs are sparse, form 9% of the total cover, and include (in order of most to least abundant) *Symphoricarpos albus* (Snowberry), *Rosa gymnocarpa* (Bald-Hip Rose), *Daphne laureola* (Spurge-Laurel), *Oemleria cerasiformis* (Indian Plum), and *Amelanchier alnifolia* (Saskatoon). The herb layer covers 80% of this unit and is dominated by grasses, particularly *Dactylis glomerata* (Orchardgrass) and Brome species. Brome species included *Bromus pubescens* (Downy Brome), *Bromus hordaeceus* (Soft Brome), *Bromus tectorum* (Cheatgrass), *Bromus sterilis* (Barren Brome), and *Bromus carinatus* (California Brome). Other grasses (small percentage of unit) include *Anthoxanthum odoratum* (Sweet Vernal Grass), Anthoxanthum aristatum *(Annual Vernal Grass),* Anthoxanthum spp. *(Small Spiked Vernal Grass),* Festuca ovina *(Sheep Fescue),* Fescuta arundinacea *(Tall Fescue),* and Agrostis capillaries *(Colonial*

Bentgrass). All of these grass species are invasive with the exception of *Bromus carinatus* (California Brome) which makes up a trace percentage of the ground cover. The moss layer is somewhat developed with *Rhytidiadelphs triquetrus* (Electrified Cat's Tail Moss), *Dicranum scoparium* (Broom Moss) and *Kindbergia Oregana* (Oregon Beaked Moss).

5.5.3 Nootka Rose (OR6iM)

Dense multi-layer shrub thickets of *Rosa Nutkana* (Nootka Rose) and *Symphoricarpos albus* (Snowberry) with occasional *Holosdiscus discolor* (Oceanspray). These sites show a moisture-receiving lower slope preference and are inferred to be overlain by 30 + centimeters of glacial diamicton. There are very few trees in this unit, usually mature *Psuedo-tsuga menziesii* and young to older generation *Quercus garryana*. The dense shrubs account for approximately 95% of this units cover. Groundcover is typically sparse with occasional patches of *Rhytidiadelphs triquetrus* in moister areas, and deciduous leaf litter proximal to *Quercus garryana*.

5.5.4 Mixed Garry Oak – Douglas-fir Forest (GO6iM)

Irregular stand with dominant *Quercus garryana* and lesser *Psuedo-tsuga menziesii*, *Abies grandis*, *Crataegus douglasii*, and exotic fruit trees. Exotic trees were generally clustered along the southern edge of the property but others were found occasionally through this unit in generally more open spots and included *Malus pumila* (common Apple), *Prunus cerasifera* (Cherry Plum), and *Pyrus communis* (European Plum). GOERT currently classifies all of the exotic fruit trees present as invasive species. Soil moisture regime goes from 2 to 5, decreasing with distance from outcrops. Soil nutrient regime is rich to very rich and has deep soils (~50 cm +/-) composed of a matrix of fine grained glacial silts and sand with 5-30% course fragments. Coarse fragments are rounded to sub-angular and poorly sorted. Lots of white mycelium fungi in the soil here, looks very healthy. The shrub layer is dense and multi-storied. The upper layer is defined by sporadic larger shrubs which include *Oenleria cerasiformis* (Indian Plum), *Amelanchier alnifolia* (Saskatoon), and *Holodiscus discolor* (Oceanspray). The lower shrub layer is composed predominantly of *Daphne laureola* (70-85%), with minor amounts of *Symphoricarpos albus* (Snowberry) and *Mahonia aquifolium* (Tall Oregon-Grape). The moss layer is not well developed but *Kindbergia Oregana* and *Dicranum scoparium* form trace to 4% of groundcover through this unit.

5.5.5 Black Hawthorn (GOgy6iM)

Dense stand of *Crataegus douglasii* (Black Hawthorn) in deepest gully on site that parallels outcrop and drains into the seasonal wet depression. Moisture-receiving seasonally wet site, likely prone to flash flooding. Multi-layred irregular canopy with *Psuedo-tsuga menziesii* in the overstory (> 10 m tall), *Quercus garryana* in the second story (~6 m tall) and *Crataegus douglasii* and sporadic exotic fruit trees in the third story (~3-4 m tall), although only *Crataegus d*. is found through the central part of the unit in the potentially wettest areas and the other tree are growing along the margins on relatively dryer micro-sites. The lower shrub layer is sparse with occasional *Daphne laureola* (1-5%). Moss layer absent.

5.5.6 Snowberry – Oceanspray (GO6sB)

Dense shrub thickets of predominantly *Symphoricarpos albus* (Snowberry) with a taller shrub component of sporadic *Holodiscus discolor* (Oceanspray) throughout the unit. Occasional young to mature *Quercus garryana* compose the tree layer and the entire canopy. Moisture-receiving lower/toe-slope sites located downslope of the seasonal wet depression and along the south and southwestern edges of the study site. Numerous graminoids and invasive species present in the largest patch of this unit in the south-western corner. Grasses identified were (in order of decreasing appearance) *Dactylis glomerata* (Orchardgrass), *Arrhenatherum elatius* (Tall Oat-Grass), *Agrostis stolonifera* (Creeping Bentgrass), and *Elymus glaucus* (Blue Wildrye). Even though *Elymus glaucus* makes up a very small percentage of the ground cover it is a good indicator species, and is the only native grass identified in this unit. Blue Wildrye shares an association with *Camassia quamash* (Camas) and *Camassia q.* was identified at BCP in this unit by Evans (2011). Camas was not identified during field work in 2016 but this is likely due to seasonality and time of field work. This unit could possibly be further divided into a Fescue – Camas association (FC) at micro-sites along the southern edge but would require further work during spring months to locate individuals of this species. Moss layer typically absent.

5.5.7 Alaska Oniongrass – Orchardgrass (DOf6iM)

Graminoid-dominated dry mid-slope sites underlain by poorly sorted glacial till. *Melica subulata* (Alaska Oniongrass) is present on dryer micro-sites and *Dactylis glomerata* (Orchardgrass) is colonizing throughout the unit and the dominant species. Other invasive grasses with a lesser presence include *Arrhenatherum elatius* (Tall Oat-Grass) and *Bromus tectorum* (Cheatgrass). Sporadic trees and shrubs. Tree layer mostly mature *Psuedo-tsuga menziesii* with lesser *Quercus garryana*, a *Rhamnus purshiana* (Cascara), and the single *Malus fusca* (Pacific Crab Apple). Numerous Garry Oak seedlings are scattered throughout this unit. Shrubs include taller *Amelanchier alnifolia* (Saskatoon), *Oenleria cerasiformis* (Indian Plum), and *Holodiscus discolor* (Oceanspray); with lower level shrubs *Symphoricarpos albus* (Snowberry), *Mahonia aquifolium* (Tall Oregon-Grape), and an average of ~20% *Daphne laureola. Lonicera hispidula* (Hairy Honeysuckle) is seen in small to medium sized patches over areas of blocky talus nearby to outcrop. *Rhytidiadelphus triquetrus* makes upto 12% of the groundcover layer with lesser *Kindbergia oregana* (4%). See *Figure 21, next page*, for a representative photograph of this ecosystem unit and the next.

Figure 21. Douglas-fir dominated Alaska Oniongrass – Orchardgrass (DOf6iM) ecosystem unit in the foreground on the left side of the trail marked by the tall grasses. Grand Fir – Oregon Grape (DGx6iC) ecosystem in the distance marked by numerous large conifers. Also shown is unit (TR1a) - the gravel trail system, which is classified as a disturbed site on the ecosystem units map. Looking east.

5.5.8 Grand Fir – Oregon Grape (DGx6iC)

Mature Douglas-fir canopy with young to mature Grand Fir dominating the regeneration layer. Relatively dry, gently sloping unit with a warm south-west aspect. The shrub layer is quite sparse but includes many species which are *Symphoricarpos albus, Amelanchier alnifolia, Rosa gymnocarpa* (Bald-hip Rose), *Rosa Nutkana, Holodiscus discolor, Oenleria cerasiformis, Mahonia nervosa* (dull Oregon Grape), *Mahonia aquifolium* (Tall Oregon-Grape), and numerous *Daphne laureola*. Trailing blackberry is found throughout vining along the ground and *Lonicera hispidula* (Hairy Honeysuckle) is observed over areas of fractured bedrock. *Galium aparine* (Cleavers) was observed vining over dead-fall. *Kindbergia oregana* and *Rhytidiadelphus triquetrus* make up the well-developed moss layer. Clusters of *Trientalis borealis ssp*. (Broad-Leaved Starflower) are noted in this unit.

5.5.9 Salal – Bracken Fern (DS6sC)

Gently sloping, convex area in the shade of the large outcrop in the north-east corridor. Moisture-receiving and holding site with nutrient rich soil and easterly facing aspect. The dense shrub layer is composed of *Gaultheria shallon* (Salal) and *Symphoricarpos albus* on dryer areas and *Pteridium* (Bracken Fern) and *Polystichum munitum* (Sword Fern) in wetter areas closer to the outcrop. Taller shrubs included a large, branching *Cornus stolonifera*, and sporadic *Holodiscus discolor* and *Oenleria cerasiformis*. *Rubus ursinus* (Trailing Blackberry) makes up 5% of the groundcover with minor accessory exotic herbs. The moss layer is composed of *Kindbergia oregana* with *Dicranum scoparium* interspersed more proximal to bedrock.

5.5.10 Mixed Douglas-fir - Garry Oak Forest (DGgyf6iM)

Mixed irregular-storied stand of predominantly Psuedo-tsuga menziesii with a secondary component of Quercus menziesii and a few occasional Crataegus douglasii & exotic fruit trees. This unit occupies shallow gullies which parallel outcrops in mid to upper slope positions, and broadens out in the mid to lower-slope of the south-east corner. Underlain by a blanket of deep (> 50 cm) soils of rich glacial till (loamy/sandy with small percentage coarse fragments). Relatively shaded moisture-receiving sites. The shrub layer is dominated by Daphne laureola (> 80% of layer) with minor Symphoricarpos albus, Oenleria ceasiformis and occasional Rubus ursinus. The moss layer relatively sparse but dominated by Rhytidiadelphus triquetrus with lesser Kindbergia oregana. See Figure 22 below for a photograph showing this units boundary.

Figure 22. Douglas-fir dominated ecosystem units. Looking from Alaska Oniongrass – Orchardgrass (DOf6iM) to the mixed Douglas-fir – Garry Oak forest (DGgyf6iM). Note the sharp boundary between where *Daphne laureola* is branching out in fingers from the mixed forest into the grassy area. Looking west.

5.5.11 Red-Osier Dogwood – Black Hawthorn (CD6iM)

Dense stand of *Cornus stolonifera* (Red-Osier Dogwood) with minor *Crataegus douglasii* and occasional mature *Psudo-tsuga menziesii* and *Quercus garryana*. This unit is orientated parallel to gullies in the study site and also parallels a drainage ditch on the road side. The moss layer is undeveloped and ground surface relatively barren. Likely a seasonal floodplain.

5.5.12 Gravel Trail Network (TR1a)

Short curvy trail system through the north-east section of the park. Made by clearing a path (several large stumps along trail) and hauling in fine gravels (mm size fraction). The layer of gravels appears to be 15-30 cm thick and is very well compacted. Occasional invasive herbs are attempting to colonize the trail edges and include Geranium robertianum (Herb Robert), Cirsium arvense (Canada Thistle), Hypochaeris radicata (Hairy Cat's Ear), Silene coronaria (Rose Champion), Hypericum glabra (St. John's Wort), and Mentha (Mint) along the margins.

5.5.13 Partly Cleared and Compacted Soils (ES2a)

A rough patch of exposed and compacted soil with numerous invasive herbs and shrubs adjacent to newest apartment development. Construction beside this area has left this patch degraded and vulnerable. There are literally no native species, just a mosaic of invaders including (in order of decreasing abundance) Daucus carota (Queen Anne's Lace), Dactylis glomerata, Daphne laureola, Lamium amplexicaule (Dead Nettle), Lamium purpureum (Purple Dead Nettle), Cytisus scoparius, Cirsium arvense, and Hypochaeris radicata (Hairy Cat's Ear). See Figure 23 for a photograph of this ecosystem unit.

Figure 23. Distrubed ecosystem unit. Looking from Garry Oak dominated Brome/Mixed Grasses (QB6tM) to the partly cleared and compacted soils (ES2a) disturbed site. Note the numerous tops of Queen Anne's Lace visible at a distance. Looking south-east.

5.5.14 Seasonal Wet Depression (ES1a)

Bare, elongated patch of hard compacted exposed soil in gully parallel to outcrop and down-slope of the Black Hawthorn (GOgy6iM) unit. The slight depression was an obvious ephemeral pool in the past but the author is unsure if the last couple years have seen drought as it looks very dry and is infilling with leaf litter. Invasive species have began to sparsly colonize the margins with ~1-3% cover by *Geranium robertianum* and *Daphne laureola*.

5.6 Rare and Endangered Ecosystems

Burnside Corner Park is home to three ecosystems that are red-listed in British Columbia by SARA. The ecosystem units and corresponding plant associations are as follows. In the Garry Oak Dominant sites is QB6tM – *Quercus garryana/Bromus carinatus* (Garry Oak/California Brome), and in the Douglas-fir dominant sites is DGx6iC – *Abies grandis/Mahonia nervosa* (Grand Fir/Dull Oregon-Grape), and DOf6iM – *Psuedo-tsuga menziesii/Melica subulata* (Douglas-fir/Alaska Oniongrass) (B.C. Conservation Data Centre, 2016). Lot 'C' will likely see development within the decade and the loss of a large portion of the Douglas-fir/Alaska Oniongrass unit, and a bit of the Grand Fir/Dull Oregon-Grape ecosystem as well. It is of paramount importance that remaining sites are conserved and restored.

5.7 Wildlife

Wildlife observed at the park included insects, butterflies, a reptile, birds and mammals. Fauna was mostly noted in zone 4, as it is the largest patch with the least edge effects and most varied landscape & habitats.

5.7.1 Insects

An anthill is present in zone 4 at the base of a large (> 1 m dbh) Douglas-fir (Psuedo-tsuga menziesii) tree. The hill is a buzz of a activity with thousands upon thousands of ants bustling around a mound with a diameter of about one meter and a height of about 0.5 meters. In the area close by the ant hill there are relatively more ants on the ground surface and they decrease in abundance with distance from the hill. The *Hymenoptera: Formicidae* have black bodies with red heads, and are 5 to 7 mm lengthwise. Woodlice *(Isoptera)* were noted in a soil pit dug in the south-east central area of zone 4 in a mixed conifer dominated section of forest. Native gall wasp *(Cynipidae)* larvae balls (average 1 centimeter diameter, yellow with tiny red spots) were observed on the underside of Oak leaves in zone 1 proximal to the main trail. Native gall wasps do not pose a serious threat to *Quercus garryana* as their populations are moderated by native parasitoids (GOERT, 2016) but it is important to watch for smaller larvae balls of the Jumping gall wasp, which is an introduced pest that can cause sudden oak death.

5.7.2 Butterflies

Two butterfly species were observed at the park, Woodland Skipper *(Ochlodes sylvanoides)* and Cabbage White *(Pieris rapae).* Both species were seen with weak regularity, typically around exotic flowering plant species as there were no native species flowering during the time of field work. *Ochlodes sylvanoides* is a common native butterfly and *Pieris rapae* is an exotic species originally found in Europe, Asia, N. Africa and S. America.

5.7.3 Reptile Case Study - European Wall Lizard

On the very first visit reconnaissance visit to the site a European wall lizard *(Podarcis muralis)* was identified basking in the sun on the West side of a mature Douglas-Fir *(Psuedo-tsuga menziesii)* tree along the North-Western edge of the Park. The wall lizard *(see Figure 24 below)* was approximately 15 cm long and had green and black spots along its back and a grayish brown tail, making it blend in well with the vegetation. The color marking indicated it was a male member of the species, and this was the only individual observed at the study site.

Figure 24. European wall lizard *(Podarcis muralis)* basking on south-west facing side of a mature *Psuedo-tsuga menziesii.* Vines of *Lonicera ciliosa* (Western Trumpet Honeysuckle).

European wall lizards were introduced to Vancouver Island in the 1970's when a handful were released into the wild following the closure of a small private zoo (Royal BC Museum, 2011). It is important to note this invasive amphibian as it lies in the same range as the British Columbia native Northern Alligator Lizard *(Elgaria coerulea principis)* and lives on the same food source; luckily, their habitat ranges differ where *Podarcis muralis* prefers the disturbed edges adjacent to human influence and *Elgaria coerulea principis* the undisturbed natural environments within larger patches (Royal BC Museum, 2011). Since Burnside Corner Park is a relatively small patch that is close to human development it is very unlikely any Northern Alligator Lizards would be present (even given pristine park conditions) due to the size and history of disturbance at the site. For this fact, *Podarcis muralis* is not necessarily invasive at this site, but could fill a valueable habitat niche by performing similar roles to the Northern Alligator Lizard when it did live there and therefore may contribute in the sense of a novel ecosystem.

5.7.4 Birds

Throughout site visits birds sang through the forest. Observed was Black-capped chickadee *(Poecile atricapillus)* flying from branch to branch in zone 4. Also in zone 4 a Rofous hummingbird *(Selasphorus rufus)* was observed twice in the forest, which had a greenish back and orange sides. The second time *Selasphorus* was seen it was sequestering nectar from Himalayan blackberry flowers. Since native species were not flowering at the time of fieldwork the only source of nectar for the hummingbird was from exotic species. A Dark-eyed junco *(Junco hyemalis)* was observed perched on a branch and flying from zone 1. A bald eagle *(Haliaeetus leucocephalus)* was seen circling above the most expansive *Quercus garryana* outcrop ecosystem at the northern edge of the park in zone 4. American robin *(Turdus migratorius)* was noted several times on the patch of lawn parallel to Burnside Road, inferred to be looking for worms in the shorter grass. A red-breasted sapsucker *(Sphyrapicus ruber)* was observed for a moment on the side of a tree on the southern forests edge and also in mid-flight in the central part of zone 4.

5.7.5 Pollinator Interaction with Invasive Species

During the time of field work (July, early August) pollinator interations took place soley with invasive exotic species. *Rubus armeniacus* (Himalayan Blackberry), *Cirsium arvense* (Canada Thistle), and Geranium robertium (Herb Robert) (among many others) were all visited by native and exotic pollinators. Specific hummingbird and butterfly interactions can be found in previous sections. Numerous bee species were observed including *Apis* (Honey bees) and *Bombus* (Bumblebee). Since no native plants were flowering at the time of fieldwork the only reason the pollinators were there was because of the invasive species. It can be assumed if one visited the site in springtime there pollinators would be almost solely visiting native species. Therefore the seasonal dichotomy between native and invasive plants might work in favor of the majority of flowering plants. It is also suspected that if there were no invasive species on site, there may be other native flowering species present and in bloom.

5.7.6 Mammals

Mammals observed at the study site were black-tailed deer *(Odocoileus hemionus columbianus),* and eastern cottontail rabbits *(Sylvilagus floridanus).* The cottontails were most often see early in the morning, along the trail darting from and to the Himalayan blackberry *(Rubus armeniacus)* thickets in zone 4. On multiple occasions *Sylvilagus* were also seen in the forest darting into patches of *Rosa nutkana* (Nootka rose)or *Rubus armeniacus*. Occasionally burrows were observed around roots of *Psuedo-tsuga menziesii*, and since *Sylvilagus floridanus.*does not dig it can be assumed that an unknown burrowing species also lives or lived at Burnside Corner Park. Black-tailed deer were most often seen bedding on the *Quercus garryana* outcrops on the north side of zone 4 *(see Figure 25),* but they were heard rustling through the bush throughout zone 4. Bedding areas for deer were found in zone 2 as well on grassy *Quercus garryana* outcrop areas. Bedding areas for *Odocoileus hemionus columbianus* were noted throughout zone 4 by matted grasses and bare soil in a circular shape. A trio of a doe and two fawns was seen regularly and on once occasion a buck was observed along the western edge of the park. Young shoots of Ocean spray *(Holodiscus discolor)* showed signs of deer browsing in zone 4 indicating this species is a part of the *Odocoileus* diet at sapling stage. A pristine white skeleton of a deer is located close to outcrop in the eastern side of zone 4, and a jaw bone was observed close to the zone 4 outcrop on the western side. It is inferred that the bones are here because the deer would go to these bedding areas for comfort in a time of death. Since the deer had time to reach them, along with no evidence of a carnivore (bones still in place), it can be inferred the death was due to old age or poisoning. Although not-provable, the deer *could* have died from eating the berries, leaves or bark of *Daphne laureola*.

Figure 25. Curious fawn black-tailed deer (Odocoileus hemionus columbianus) in the scrubby Garry Oak outcrop and Brome/Mixed Grasses area in the north-west of zone 4. Note the shadow of the mother doe watching intently from behind the grasses to the right of the fawn.

5.8 Invasive Species Mapping

The first invasive species map for Burnside Corner Park was completed by Amanda Evans in 2011 and since then *Daphne laureola* has drastically expanded its reach through the park, and other species have spread while new ones have popped up. A lot has changed in the last five years that warrants attention. Locations of major patches and individuals were mapped for nine of the most common invasive plant species *(please refer to Figure 26. Invasive Species at Burnside Corner Park - July 2016, below)*

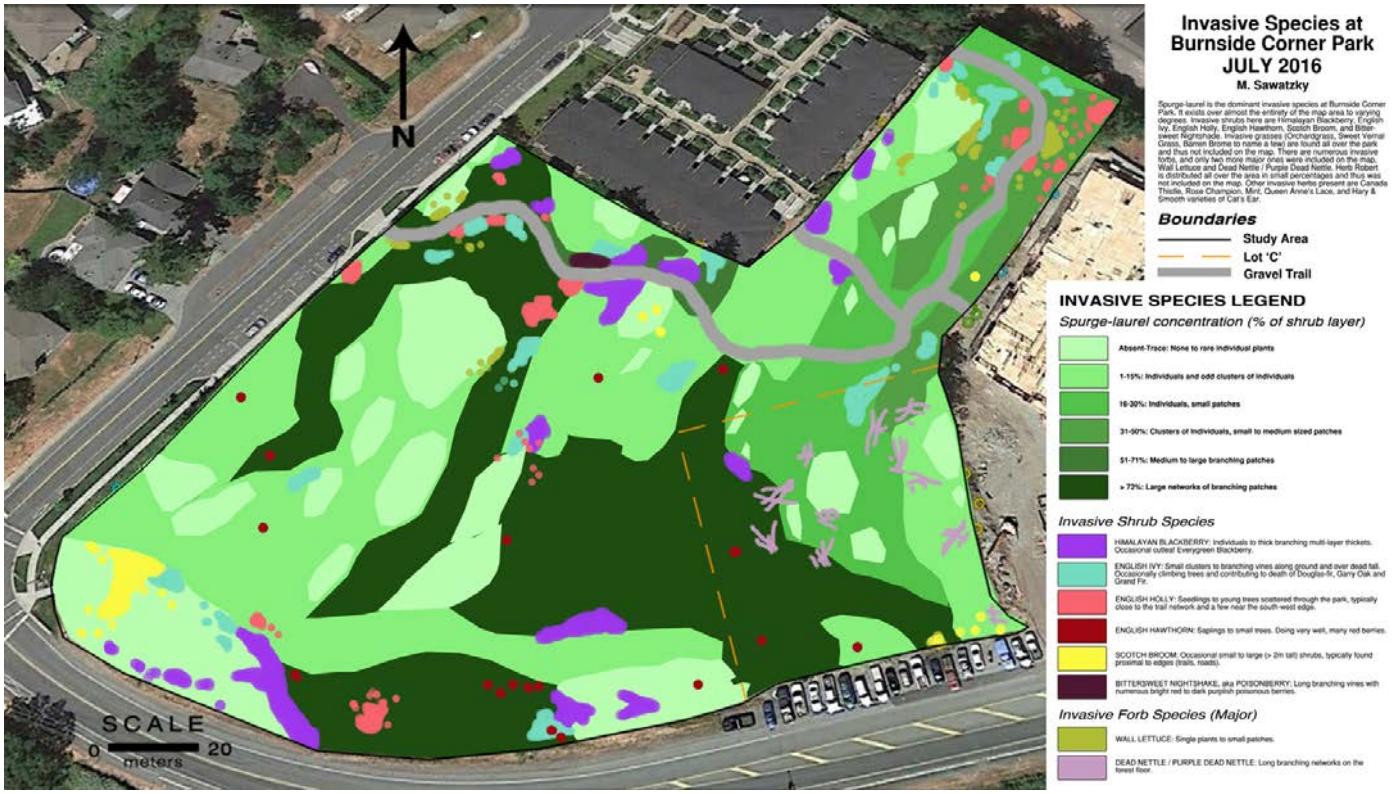


Figure 26. Invasive Species at Burnside Corner Park – July 2016. Please refer to *Appendix G* for a larger version of this map.

These were (in order of decreasing abundance) shrubs - *Daphne laureola, Rubus discolor* (Himalayan Blackberry), *Hedera helix* (English Ivy), *Ilex aquifolium* (English Holly), *Crataegus laevigata* (English Hawthorn), *Cytisus scoparius* (Scotch Broom), *Solanum dulcana* (Bittersweet Nightshade), and herbs - *Lactuca muralis* (Wall Lettuce), *Lamium amplexicaule* (Dead Nettle) and *Lamium purpureum* (Purple Dead-Nettle). *Geranium robertianum* is distributed all over the area in small percentages and thus was not included on the map. Invasive grasses (Orchardgrass, Cheatgrass and Barren Brome to name a few, *see full list in section 5.1 Species List*) are growing throughout the park, especially in places with native grasses, out-competing them and re-colonizing with predominantly *Dactylis glomerata*. Other species not included on the map were invasive forbs growing near the entrance to the main trail, and in the disturbed site in the south-west corner (ES2a). These are individuals to clusters of *Cirsium arvense* (Canada Thistle), *Cirsium vulgare* (Bull Thistle), *Silene coronaria* (Rose Champion), *Hypericum perforatum* (St. John's Wort), *Hypochaeris radicata* (Hairy Cat's Ear), *Mentha* (Mint), and *Daucus carota* (Queen Anne's Lace). An individual of *Hypochaeris glabra* (Smooth Cat's Ear) was identified on the top

of the large outcrop in the north-east corridor, and a *Rubus laciniatus* (Cut-Leaved Blackberry) was identified in the central part of zone 4 near the head of the seasonal wet depression.

5.8.1 Habit and Distribution of Daphne laureola

Daphne laureola is distributed throughout the project site as individuals, small to large clusters, medium to large branching patches and as large networks of branching patches. Percent cover of Daphne in general changes with ecosystem units and thus is a good way to determine severity of invasions. In areas with dense Daphne cover the plants typically grew straight up and were quite tall. At margins and away from main patches the plant usually had a main root zone that branched off into three main branches, and the plant was in general quite a bit shorter, quite bushy and with numerous accessory branches. It appears that when *Daphne* is initially introduced in an area it always takes on the shrubby habit but after enough of its berry-born seedlings have started to grow around it they take on the taller skinny habit due to space confinement. A study by Castilla et. al. (2011) shows that geographically isolated populations of *Daphne laureola* have greater shoot growth than continuous populations. This is likely due to the increased level of nutrient availability for one plant versus many, but also likely as a response mechanism to stress at outside edges and less optimal conditions. The plants that were more spread out had typically more berries than their tall skinny counter-parts as well, indicating increased pollinator service in these sparser areas. Optimally, Spurge-laurel preferred deeper soils in shaded moisture-receiving sites in mixed *Quercus garryana* – Douglas-fir forests the most (85%+ of ground cover). Patches of Daphne became less continuous in dryer, sunnier areas, indicating these spots were not optimal for growth. A two year study done by Lei (2014) that focused on *Daphne laureola* in Victoria, B.C. suggested they attain highest densities at with 12 to 15% canopy openings (85-88% canopy cover), with densities decreasing with higher percentages of canopy openness. A study on soil richness and soil biota suggests that high nutrient environments (such as the deeper moisture-receiving sites) are more vulnerable to plant invasions as well (Chen, 2010), which also is concurrent with site observations. The only ecosystem *Daphne* was completely absent from was the Garry Oak Outcrops (OMvw1b) which were on the driest, shallowest, most open-canopy areas at the study site. The seasonal wet depression (ES1a) and Snowberry – Oceanspreay (GO6sB) ecosystem units only had trace *Daphne laureola* but it was still present in some capacity.

5.8.2 Habit and Distribution of Invasive Vegetation

Himalayan Blackberry and in one occasion, *Rubus laciniatus,* form branching thickets of thickly spiked canes with many berries. The densest thickets are along the southern edge of the park and at the head of the largest gully along the main trail. *Rubus discolor* is also present in small patches along the edges of the first apartment building in the area (north-west) and along the main trail. English Ivy is found creeping along the ground or climbing native trees along edges and through the central area of the zone 4. Trees infested with Hedera Helix are described in *section 5.2.7* and include (in order of decresing abundance) *Psuedo-tsuga menziesii, Quercus garryana*, and *Abies grandis*. English Holly is present as seedlings to trees, typically found as one tree with several smaller ones around it but seedlings were noted in other locations at distances from trees. The distribution of *Ilex aquifolium* suggests it prefers deeper moisture receiving sites, and is located proximal to the trails and road in most cases. English Hawthorn is present as saplings and small trees, typically branches were seen full of bright red berries. There is a cluster of *Crataegus laevigata* along the southern edge (Watkiss Way),

but also sporadic healthy individuals were identified through zone 4. Scotch Broom was present as individuals and clusters of individuals, from 20 cm in height to over 2 m tall. Most of the *Cytisus scoparius* is located in a patch in the south-west corner in the Snowberry – Oceanspray (GO6sB) ecosystem unit, with smaller patches in the south east disturbed area (ES2a), and a few individuals along the main trail. Bittersweet Nightshade forms long branching vines with spade shaped leaves, purple flowers and numerous red berries. There is a dense patch of *Solanum dulcana* on the north side of the main trail across from the head of the deep gully. Wall Lettuce is a small to medium sized herb with long reddish stalks, yellow flowers and sticky green seeds. This herb prefers shaded moisture-receiving sites adjacent to rock outcrops is present as individuals or clusters of individuals. Dead Nettle and Purple Dead Nettle *(Lamium spp.)* were identified forming branching networks along the forest floor in the south-east of zone 4.

5.8.3 Spread of Invasive Vegetation

Invasive species all share one common characteristic. They are all predominantly located along edges to either the road(s), the trails, and/or the apartment buildings, and branching into the park to some degree. Along these edges trees are cut down, soil is disturbed, and foreign seeds are transferred. Once the invasive species is established in one location it is a matter of time before it is transferred into other portions of the zone and ultimately the park. This is evidenced by largest clusters of invasives at the edges but sporadic individuals within the park. Invasive species also tend to be found together, in areas with dense populations this could likely be due to alterations in soil chemistry that makes it more difficult for native plants to grow in these areas.

It appears *Crataegus laevigata* has been growing at the study site since the exotic fruit trees were planted and it is inferred that it may have also been planted around that time due to its similar size and distribution as the fruit trees. These exotic species, English Hawthorn, Cherry Plum, and European Pear were likely the first invasive species at the site, and although classified as invasive they haven't done much compared to the take-over by *Daphne laureola* and rapid dispersion of other invasive shrubs and herbs.

5.9 *Daphne laureola* Removal

The initial removal of *Daphne laureola* was a work party event presented by the author and Jenny Hebb (View Royal Parks), which took place on Sunday, June 24th, 2016 from 10 am to 1 pm. After an introduction and gathering tools the group of eight broke off into three teams which each eradicated patches in different zones with the goal in mind of full removal of the isolated three north-east zones (1, 2, and 3). The work party was a success; with approximately half of the *Daphne laureola* in zones 1, 2 and 3 being removed that day and hauled to the main trail entrance on tarps for pick-up and disposal. A large English Holly tree was also sawed down close to the trail in the north-east corridor, and smaller *Ilex aquifolium* seedlings were cut at ground level. As many vining branches possible of the *Solanum dulcana* along the main trail were also cut and hauled out of the park by the work party.

Over another six days the author spent time meticulously removing the remaining *Daphne* from zones 1, 2 and 3 in effort to complete the goal of full eradication. The author also removed *Cytisus scoparius* by the root from a location in zone 3 and beside the trail in zone 4., several canes of *Rubus discolor* was cut and removed from along the main trail, and whenever *Hedera helix* or *Ilex aquifolium* were found in a patch of Daphne they were also removed along with the Spurge if possible. Due to time limitations and placement of remaining patches (within dense Nootka Rose thickets, and very close to apartment windows) there are still a few small plants and small patches of *Daphne* that persist in the northern zones. Work efforts has seen the removal of 98% of *Daphne laureola* from the three north-east zones, with a bit of Spurge remaining in zones 1 and 2, but 3 is confidently fully eradicated. Please refer to *Figure 27* for a map of the site following removal, and *Figure 28 A & B (next page)* for photographs of the removal team and piles of debris removed from Burnside Corner Park.

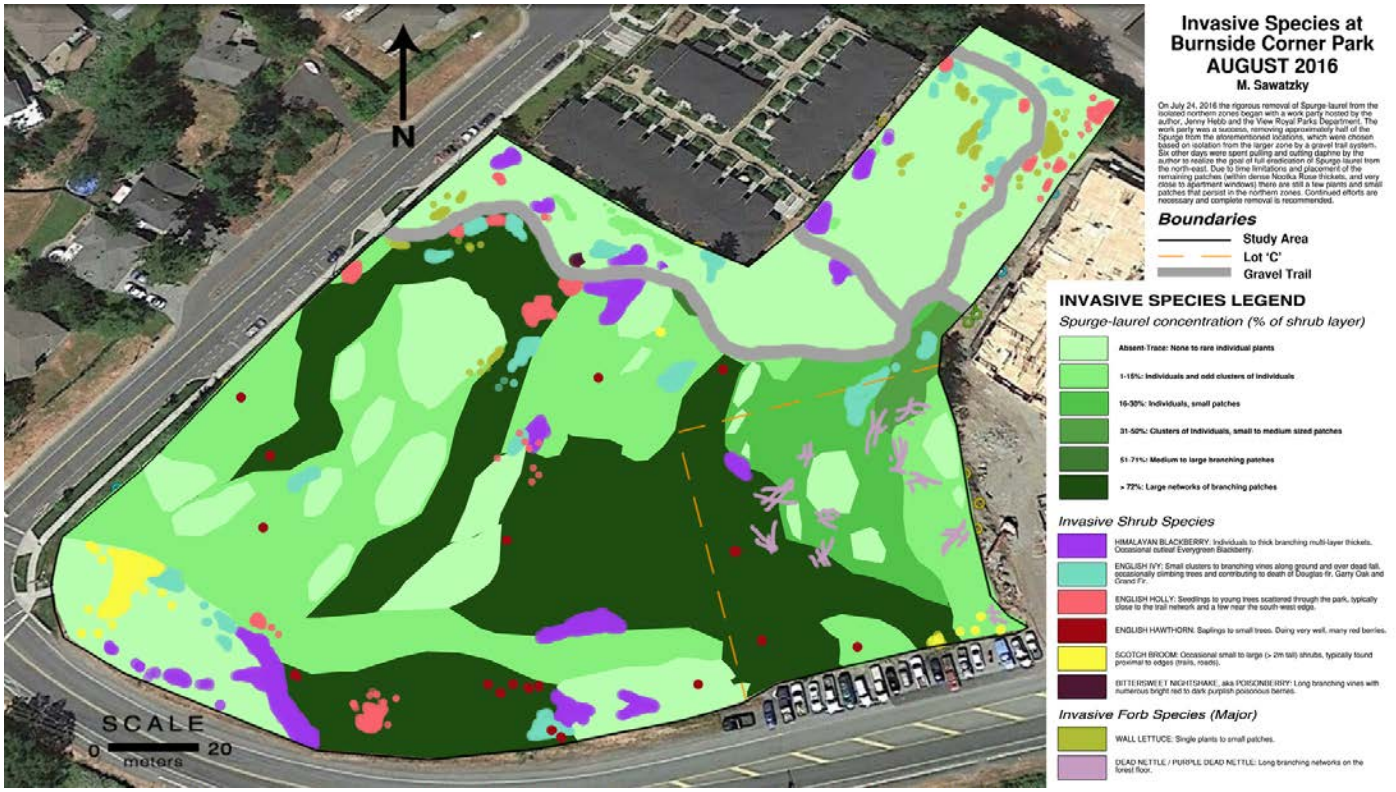


Figure 27. Invasive Species at Burnside Corner Park – August 2016. A larger version of this map can also be found in *Appendix G.*

(A)

(B)

Figure 28. Photographs of the removal team and debris piles. (A) End of work party day with pile of *Daphne laureola* in the background. From left to right: Veronica Jones, Camilla Smith, Jenny Hebb, Adam Conner, and the author, M. Sawatzky. (B) Final pile of debris from follow-up pulls.

5.10 Photo Point Monitoring Sites

Photo-points were chosen along the existing trail system for ease of repeatability. Please see Table 3. for a list of points, location data and photo directions. *Appendix I* contains a hand-drawn map of the trails and placement of the photo-points with arrows indicating photo directions. *Figure 29 (below and next).* shows before and after pictures for a representative number of photo points, and photographs from all points can be found in Appendix J.

Table 3. Photo point monitoring locations and information.

Photo-point	Datum	UTM Zone	Easting (mE)	Northing (mN)	Elevation (m)	Photo Direction(s)
P-1	WGS84	10U	467100	5368143	28.7	E, S
P-2	WGS84	10U	467116	5368137	25.1	N, E
P-3	WGS84	10U	467136	5368138	25.4	N
P-4	WGS84	10U	467144	5368129	23.7	E, SE
P-5	WGS84	10U	467145	5368127	25.2	S, NE
P-6	WGS84	10U	467192	5368118	28.5	N
P-7	WGS84	10U	467208	5368120	29.4	W
P-8	WGS84	10U	467224	5368141	29.2	W, S
P-9	WGS84	10U	467242	5368165	24.9	E
P-10	WGS84	10U	467233	5368178	29.4	N, W

(A) Before

(A) After

(B) Before

(B) After

(C) Before

(C) After

(D) Before

(D) After

(E) Before

(E) After

Figure 29. Photo Point Monitoring Sites Before (July 2016) and After (August 2016). (A) Photo point P-3 looking north. (B) P-4 looking east. (C) P-5 looking north-east. (D) P-7 looking west. (E) P-9 looking east. Photos were taken at the same time of day (morning) to achieve similar shadows.

5.11 Possibility of Rare/Threatened Native Species

There is a possibility of presence of numerous rare and endangered Garry Oak ecosystem associated plants at Burnside Corner park. The determination that this site was once a more open woodland meadow suggests there is a rich native seed bank. These seeds need optimal conditions however to germinate and tend to remain closed when invasive species are present. This could possibly be linked to soil chemistry alteration of invasive vegetation but also due to the fact there is less nutrients and moisture available in the soil (rapidly being recycled by invasive vegetation). Many restoration studies of Garry Oak woodlands suggest that once the invasive flora is removed native plants start to re-appear and re-colonize the area. The seeds and other bits of recycled matter in the soil from the past can be viewed as the ecological memory, which is an important aspect of ecosystem health (Schaefer, 2011). Restoration also can include re-planting of native species to re-establish ecological memory but was not done during this study as per recommendations of the GOERT's Best Management Practices. The Best Management Practices *(Appendix D)* suggest leaving the site for 2-3 years following initial removal of mature *Daphne laureola* and then performing a second pull over the area for a more complete eradication before subjecting native plants to the soil in these areas. This could possibly give the soil time to return to a more native state with respect to soil chemistry and biota.

5.12 Interactions with Residents

There were numerous interactions with residents at the study site. Initial interactions happened during fieldwork close by to the apartment complex. One woman was worried that I was measuring trees to be cut but assured her I was just doing a study and would like the trees to remain. Another older woman asked if I could get a tree cut down as it would "blow very close to her house/windows" during wind storms. I explained the tree was a Garry Oak and how important they are to conserve but if she is really uncomfortable to get in contact with her landlord or the parks department. The day of the work party the entire crew was called into View Royal Parks, as a resident was worried that we were a group of homeless people building a new place to live. Following that, the author always wore a safety vest and didn't encounter that problem again, but is very eager to hear how the interpretive sand-which board sign works for future pulls. While the sand-which board was being constructed the author learned that one of the groundskeepers at her building actually did a lot of work with GOERT in the past and he was very encouraging about the Daphne removal and mentioned out of disbelief that he's seen people tend Daphne thinking that it is a Rhododendron. Other interactions with residents included a younger woman calling down from the eastern apartment curious as to what I was doing, very ok with everything; and an older lady walking her dog who was wondering why I was pulling out all the Rhododendrons. I kindly explained that these were actually *Daphne laureola*, similar looking, but a poisonous invasive version that I am helping to remove from the park as a part of my study. On the last day of *Daphne* removal a resident who was in the know about invasive plants thanked me for removing the species from the park.

5.13 Interpretive Sandwich Board Signs

Two interpretive sandwich board signs were built for future Daphne pulls at Burnside Corner Park and were passed on to Chris Garret of the View Royal Parks Department on August 5th for use in future

removals. The signs show photos of *Daphne laureola* and describe the species and dangers of the plant. At the bottom of the sign there is contact information for Jenny Hebb and the View Royal Parks Restoration Website address for people who are interested in invasive species removal to get in touch. The sandwhich board will be a great addition to any removal, providing an explanation for neighborhood residents that are curious to whats going on but might be too shy to ask, and also as a recruitment tool for new restoration volunteers. It is suggested that extra large pillow cases are bought to use as protective covers to the imagery on the signs stays pristine during travel. See *Figure 30 below* for a photograph.

Figure 30. Photograph of the sandwich board interpretive sign at the park.

5.14 Threats

Threats to the current ecology at Burnside Corner Park are:

- Clearing and development of lot 'C' at the south-east corner of the park.
- Spread of current invasive species.
- Introduction of other invasive species via roads, trails.
- Humans (& pets) walking on outcrops or through the forest without looking where they are going could trample native species and spread exotics.
- Further zonation and development.

5.15 Climate Change

As we shift into a hotter, dryer climate the site will likely shift to more Garry Oak dominated ecosystems. *Quercus garryana* prefers dry, rocky sites and surrounding areas like at the study site and it is inferred that pre-settlement, Garry Oak ecosystems took up the majority of parkland prior to conifer encroachment starting in the 1800s. As conifers dry up with less moisture and more heat, more and more *Quercus garryana* seedlings and saplings will have a chance to reach the canopy. This is if invasive species are controlled. Invasive plants are also drought resistant and will likely be fine with climate change and therefore must be removed and closely monitored. When thinking about restoration and climate change it is important that measures are taken to assist the park along this trajectory (i.e. planting species for hotter/dryer climate). Following removal of more and more invasive species areas will need to be re-planted. Native species should be chosen based on Garry Oak plant associations with the ecosystem units (as per recommendations in Restoring British Columbia's Garry Oak Ecosystems manual by GOERT, 2011). The additional native Garry Oak ecosystem plant species will likely attract more pollinators to the area and possibly rare butterflies also associated with these ecosystems.

6.0 RECOMMENDATIONS

The following recommendations are provided for Burnside Corner Park:

- Install Garbage Can
  Since the installation of the gravel trail network at BCP, it is reasonable to assume increased flow of human and dog-walker traffic. This can also be seen by random garbage (bottles, cups), and the numerous little poop baggies tossed into the woods near the entrance to the park. It is highly recommended that the city of View Royal install a garbage can close to the park entrance to prevent the continuation of this trend.

- Remove <u>all</u> *Daphne laureola*
  Complete removal of the last 2% of *Daphne* from zones 1 and 2. Zone 4 will require a lot of work and volunteer hours. It is important that removal starts at the edge along the main trail and works its way into the patch (forest) from north to south.

- Use Sandwich Board Signage for *Daphne* Removals
  The sandwich board signs were designed and built to be used for *Daphne laureola* pulls at Burnside Corner Park (and View Royal Parks). These should both be utilized for every pull that includes *Daphne*. This will help create public awareness and also get people interested in volunteering for invasive species removal.

- Continued Invasive Species Removal
  The Burnside Corner Park Restoration Management Plan (Evans, 2011) lays out a vigorous invasive species removal plan that needs to be followed. If not, native species will continue to be suppressed and replaced with invasives, worsening a problem that is relatively simple to eradicate in the early stages.

- Monitoring of Native Species
  The park should be monitored for emergence of different native species throughout the seasons. As field work done for this report was completed during summer months, if one accessed the site at another time of year (particularly the springtime) they would likely see different herbaceous species.

- Monitor Tall Trees
  The site should be monitored for tall dying Douglas-fir and Grand Fir trees as these could be blown over in a heavy windstorm.

- Remove all Garbage
  There is garbage scattered through the park, typically larger industrial-type (i.e. plastic bucket, sheets of metal, drywall smoother), but also various glass bottles, beer cans and occasional clothes (some spots at this site have been home to campers in the past). It is recommended that all of this be removed as soon as possible.

7.0 CONCLUSIONS

Burnside Corner Park is urban parkland under development in View Royal, B.C. This report monitors the ecology and invasive species at the site and took place in July – August, 2016. A total of 735 trees of 11 species were identified in the study site and dbh measurement was used as an analogy for age to help reconstruct the ecological history of the site. Prior to settlement the site was likely a open Garry Oak meadow woodland throughout, with a few odd Douglas-fir trees. Following settlement in the 1800s we see a rapid increase in conifers and slow decrease in *Quercus garryana* (due to halt of traditional management practices by fire). Sometime in the early 1900s fruit trees were planted along the southern edge of the study site, which is likely an edge to a previous orchard. Fruit trees present are common Apple, European Pear and Cherry Plum, and these have been distributed through the park by varying degrees likely by wildlife/humans. The mid-1900's saw the arrival of major invasive plant species such as Scotch Broom, English Holly, Engish Ivy, and Himalayan Blackberry. Along with these was *Daphne laureola*. *Daphne* was found throughout the park (upto 85% +), densest in shaded moisture-receiving sites with relatively deep soil. In 2011 the north-west corner was cleared for the first apartment and in 2014 the south-east corner was cleared for an apartment development. Somewhere in this time frame the new drainage pipes and windy gravel trail was installed in the northern areas of the park. The park has seen the spread of all invasive species since the production of

the first invasive species map for the site created in 2011 by Evans. Densest invasive species are clustered along the trails and edges to the park and branching inward. A total of 73 plant species were identified at the site, 37 of them being invasive exotic species. Fourteen terrestrial ecosystem units were mapped. Six of these were Garry Oak dominated, 5 Douglas-fir dominated, and 3 were disturbed sites. Three of these ecosystem units are rare/endangered (BC Red List) which include the Garry Oak/California Brome, Grand Fir/Dull Oregon Grape, and the Douglas-fir/Alaska Oniongrass plant associations.

Over the course of a work party on July 24th, 2016 and six subsequent removals 98% of the *Daphne laureola* was removed from zones 1, 2, and 3; and zone 3 is fully eradicated of *Daphne*. While removing the plants it felt like the forest could breath so much better and was a very rejuvenating experience not only for the forest, but for the author as well. Two fold-out sandwich board interpretive signs were designed, constructed and passed along to the city of View Royal to be used during *Daphne* pulls. These signs will create awareness about the invasive plant and also encourage potential volunteers to get involved. The concept of ecological memory suggests that once the invasive species are removed the native ones will re-establish from the native seed bank. This may also need to be augmented by re-planting in particularly barren areas, but the author infers many Garry Oak meadow wildflower seeds (i.e. Camas, White Fawn Lily, Chocoloate Lily) may be present in the soil but suppressed by invasive plants and grasses (particularly *Daphne laureola* and *Dactylis glomerata*). Burnside Corner Park is a special patch of remaining CDFmm, containing old growth and mature *Quercus garryana* and *Psuedo-tsuga menziesii* forest and scrubby Garry Oak habitats, which in order to be conserved warrant our attention.

ACKNOWLEDGEMENTS

The author would like to thank Valentin Schaefer for project guidance and the Restoration Of Natural Systems program for providing the foundation of knowledge necessary for completing this report. Thanks to Jenny Hebb at View Royal Parks Restoration for assistance in finding an appropriate site, organizing a work party with myself, and liaison with the city Parks staff. Thanks to the View Royal staff working behind the scenes to help set up the removal – Jennifer Smith, John Rosenberg, Dave Podmoroff, and Chris Garrett. High fives and thanks to everyone who participated in the work party on July 24th – Adam Conner, Veronica Jones, Jenny Hebb, Chris Garrett, Camilla Smith, Mark Cacouic and John Rogers. Thanks to Val and the RNS Program for lending out tools for research/restoration and View Royal Parks for providing tools, tarps, and pick-up/disposal for the work party and subsequent pulls. The author would also like to thank Jenny Hebb and Gary Sawatzky for assistance with plant identification on initial site visits; and Amanda Evans for personal communication and the management plan for the site. Without your help and hard work this would have not been possible, a gracious thank-you to everyone who took part.

REFERENCES CITED:

B.C. (2010). Field Manual for Describing Terrestrial Ecosystems -- 2nd Edition. Land Management Handbook, 0229-1622; 25. Co-pulished with B.C. Ministry of Environment and the B.C. Ministry of Forests and Range. Also available online.

B.C. Conservation Data Centre (2016). BC Species and Ecosystems Explorer, B.C. Minist. of Environ. Victoria, B.C. Retrieved on August 10th, 2016 from http://a100.gov.bc.ca/pub/eswp/ .

Blyth, H. E., and Rutter, N. W. (1993). Surficial Geology of The Victoria Area. NTS Map Sheet 92B/6; 1:50,000 scale. Province of British Columbia Ministry of Energy, Mines, and Petroleum Resources. Geological Survey Branch Open File 1993-23.

Brown, K. J., and Hebda, R. J. (2002). Ancient Fires on Southern Vancouver Island, British Columbia, Canada: A Change in Causal Mechanisms at about 2,000 ybp. Environmental Archaelogy 7: 1-12.

Castilla, A. R., Alonso, C., and Herrera, C. M. (2011). Exploring local borders of distribution in the shrub Daphne laureola: Individual and populations traits. Acta Oecologica 37: 269-276.

Chen, Y. (2010). The Importance of Soil Biota and Nutrient Availability in Plant Invasions. Institute of Evolutionary Biology and Environmental Studies, University of Zurich. January 2010.

Clima Temps (2014). Victoria (Airport), Bc, Canada Climate Graphs. Retrieved on July 24 from http://www.victoria-aero.climatemps.com/graph.php .

CRD (n.d.). Garry Oak Meadows. Retrieved on July 21st from https://www.crd.bc.ca/education/our-environment/ecosystems/terrestrial/garry-oak-meadows .

Dennehy, C., Alverson, E. R., Anderson, H. E., Clements, D. R., Gilbert, R., and Kaye, T. N. (2011). Management Strategies for Invasive Plants in Pacific Northwest Prairies, Savannas, and Oak Woodlands. Northwest Science 85(2): 329-351.

Dunwiddie, P. W., Bakker, J. D., Almaguer-Bay, M., and Sprenger, C. B. (2011). Environmental History of a Garry Oak/Douglas-Fir Woodland on Waldron Island, Washington. Northwest Science 85(2): 130-140.

Evans, A. (2011). Burnside Corner Park – Restoration Plan and Management Recommendations. Town of View Royal, BC.

Fairchild, L. H., and Cowan, D. S. (1982). Structure, petrology, and tectonic history of the Leech River complex northwest of Victoria, Vancouver Island. National Research Council of Canada. Canadian Journal Of Earth Sciences 19.

Fleming, T. L. (2000). State of Regional Parks: An Ecological Perspective. In Proceedings of a Conference on the Biology and Management of Species and Habitats at Risk, Kamloops, B.C., 15-19 February, 1999. Volume One. B.C. Ministry of Environment, Lands and Parks, Victoria, B.C. and University College of the Cariboo, Kamloops, B.C. pp: 351-355.

Fuchs, M. A., Krannitz, P. G., and Harestad, A. S. (1999). Factors affecting emergence and first-year survival of seedlings of Garry Oaks (Quercus garryana) in British Columbia, Canada. Forest Ecology and Management 137: 209-219.

Fuchs, M. A. (2001). Towards a Recovery Strategy for Garry Oak and Associated Exosystems in Canada: Ecological Assessment and Literature Review. Technical Report GBEI/EC-00-030. Environment Canada, Canadian Wildlife Service, Pacific and Yukon Region.

GOERT (2011). Restoring British Columbia's Garry Oak Ecosystems – Principles and Practices. Retrieved on July 5th, 2016 from http://www.goert.ca/gardeners_restoration/restoration.php .

GOERT (2016). Garry Oak Ecosystems Recovery Team. Website accessed on July-August 2016 from http://www.goert.ca .

Hebda, R. (2015). Field Study in Ecological Restoration II – Course Readings. ER 312B course pack. University of Victoria, Victoria, BC.

Lei, T. (2014). Environmental preferences and constraints of Daphne laureola, an invasive shrub in western Canada. Canadian Journal of Forest Research 44: 1462-1467.

McCune, J. L., Pellatt, M. G., and Velland, M. (2013). Multidisciplinary synthesis of long-term human-ecosystem interations: A perspective from the Garry oak ecosystem of British Columbia. Biological Conservation 166: 293-300.

Murray, C. (2003). Decision Support For Managing Invasive Species in Garry Oak Ecosystems. Prepared for presentation at the Fifth International Conference on Science and Management of Protected Areas: Making Ecosystem Based Management Work, Victoria, British Columbia, May 11-16, 2003. ESSA Technologies Ltd. Victoria, B.C., Canada.

Nuszdorfer, F. C., Klinka, K., and Demarchi, D. A. (n.d.). Chapter 5: Coastal Douglas-Fir Zone. B.C. Ministry of Forests, Lands and Natural Resource Operations. Retrieved on July 10th, 2016 from https://www.for.gov.bc.ca/hfd/pubs/docs/srs/Srs06/chap5.pdf .

Pellatt, M. G., and Gedalof, Z. (2014). Environmental change in Garry oak (Quercus garryana) ecosystems: the evolution of an eco-cultural landscape. Biodiversity Conservation 23: 2053-2067.

Pojar, J., and MacKinnon, A. (1994). Plants of Coastal British Columbia –revised. Lone Pine Publishing, Vancouver, BC, Canada.

Royal BC Museum (2011). Common Wall Lizard, Podarcis muralis. Retrieved on June 21, 2016 from http://alienspecies.royalbcmuseum.bc.ca/eng/species/common-wall-lizard .

Rusmore, M. E., and Cowen, D. S. (1985). Jurassic-Cretaceous rock units along the southern edge of the Wrangellia terrane on Vancouver Island. Canadian Journal of Earth Sciences 22: 1223-1232.

Schaefer, V. (2010). Remembering our roots: A possible connection between loss of ecological memory, alien invasions and ecological restoration. Urban Ecosystems 14: 35-44.

Schaefer, V. (2015). Field Study in Ecological Restoration I – Course Readings. ER 312A Summer 2015 Course Pack. University of Victoria, Victoria, BC.

Shugar, D. H., Walker, I. J., Lian, O. B., Eamer, J. B. R., Neudorf, C., McLaren, D., and Fedje, D. (2014). Post-glacial sea-level change along the Pacific coast of North America. Quaternary Science Reviews 97: 170-192.

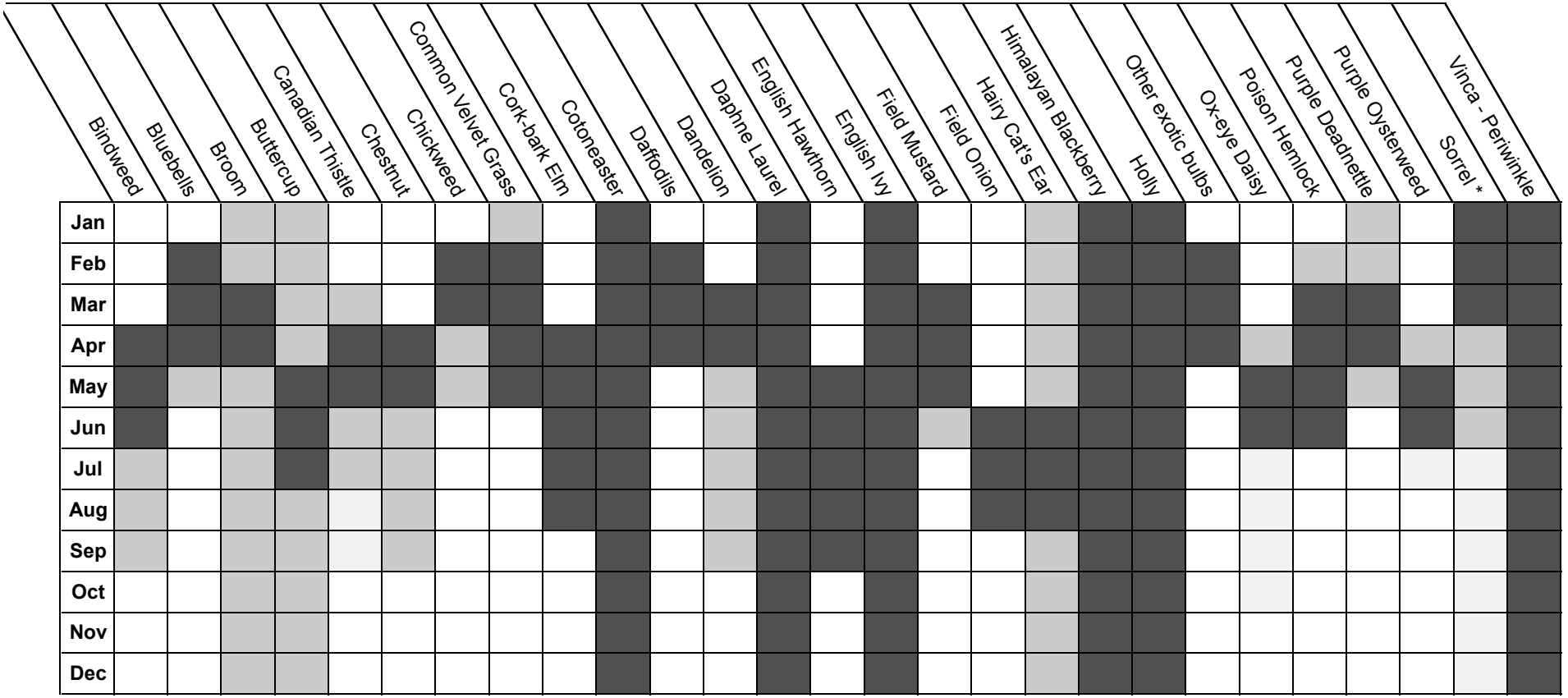
Stout, G. H. (1969). The Isolation and Structure of Daphnetoxin, the Poisonous Principle of Daphne Species. Journal of the American Cemical Society 92(4): 1070-1071.

Wang, T., A. Hamann, D. L. Spittlehouse, and T. Murdock. 2012. ClimateBC - High-Resolution Spatial Climate Data for Western North America. Journal of Applied Meteorology and Climatology 51: 16-29

WorkSafeBC (2006). Toxic Plant Warning – Severe skin irritation from Spurge Laurel (Daphne laureola). WorkSafeBC Bulletin - TP 06-01.

Zinovich, B. (2008). Terrestrial Ecosystem Mapping of the Coastal Douglas-Fir Biogeoclimatic Zone. Madrone Environmental Services Ltd., 1081 Canada Avenue, Duncan, BC, V9L 1V2. Dossier 07.0359.

Best months to kill invasive plants in Victoria



ideal	good	ok	don't bother

Plants are at their weakest when flowering and seeding, and when they are stressed (e.g., at the end of summer)

* Sorrel: best to cut off at the base in the summer, once the moss has dried

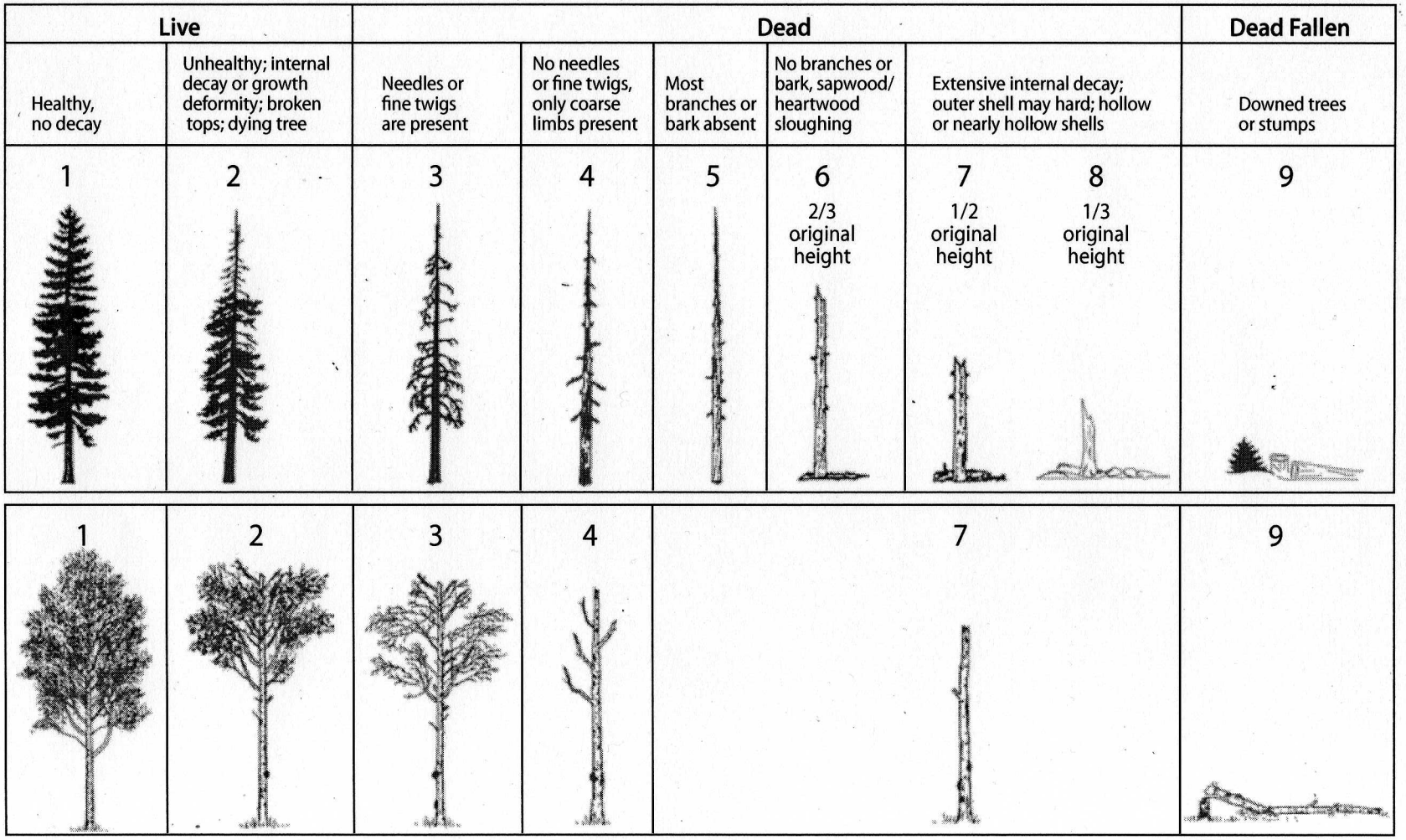
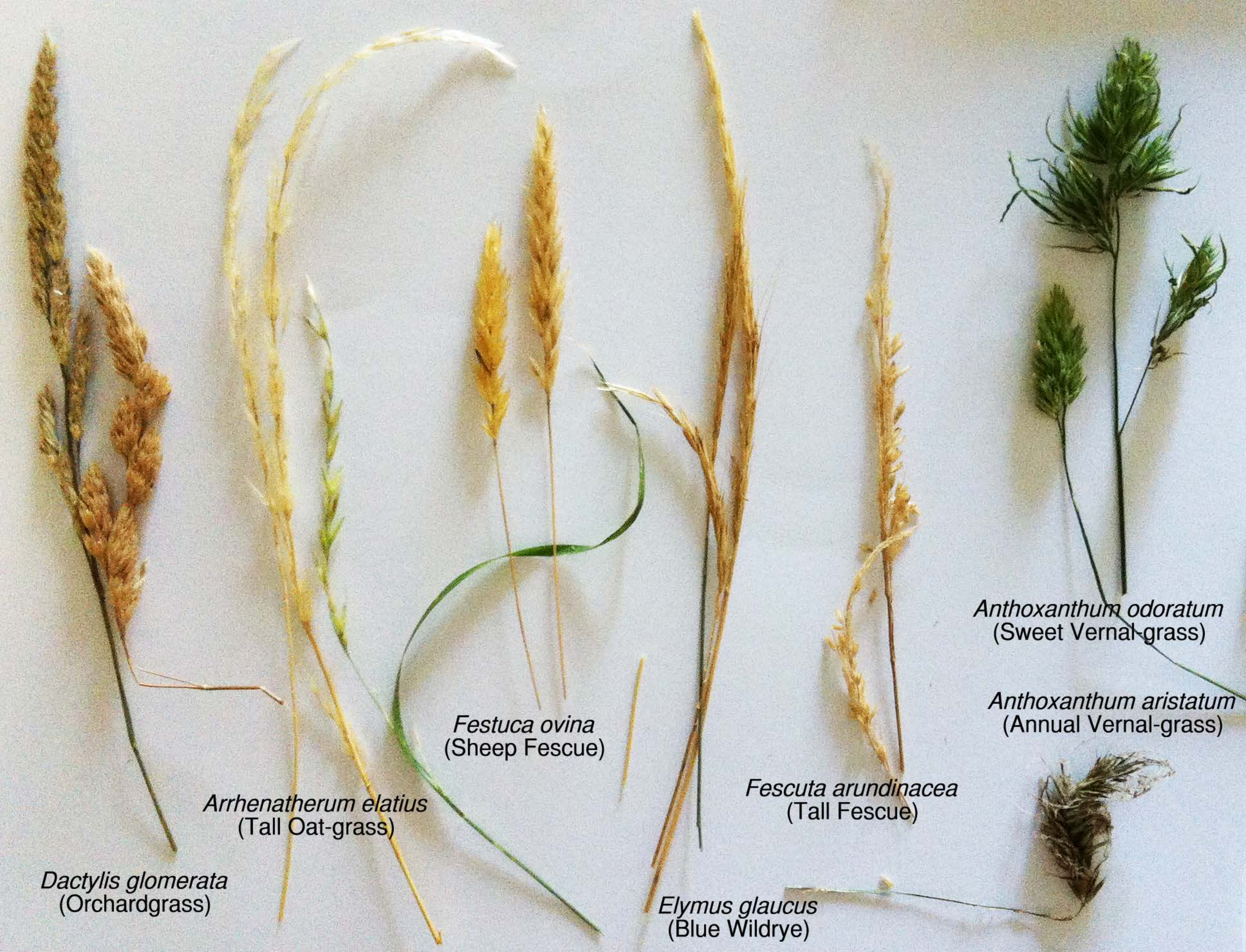


FIGURE 6.1 Visual appearance codes for wildlife trees. (B.C., 2010)

APPENDIX B.
Tree Decay Guide


Anthoxanthum odoratum
(Sweet Vernal-grass)
Anthoxanthum aristatum
(Annual Vernal-grass)
Festuca ovina
(Sheep Fescue)
Fescuta arundinacea
(Tall Fescue)
Arrhenatherum elatius
(Tall Oat-grass)
Dactylis glomerata
(Orchardgrass)
Elymus glaucus
(Blue Wildrye)


Anthoxanthum spp.
(Small Spiked Vernal-grass)
Agrostis capillaris
(Colonial Bentgrass)
Agrostis stolonifera
(Creeping Bentgrass)
Bromus carinatus
(California Brome)


Bromus pubescens
(Downy Brome)
Bromus tectorum
(Cheatgrass)
Bromus sterilis
(Barren Brome)
Melica subulata
(Alaska Oniongrass)
Bromus hordaeceus
(Soft Brome)

Garry Oak Ecosystems Recovery Team

Nature Conservancy Canada

Best Practices for Invasive Species Management in Garry Oak and Associated Ecosystems:

Daphne (*Daphne laureola*)

Assess the site characteristics and your available resources to help you decide where to take management action, what actions to take. These decisions should be made within the context of the overall restoration objectives for the site (and according to the overall restoration plan for the area or site, if one exists).

a) Deciding where to take action

The highest priority in deciding where to take action should be placed on preventing further spread of this invasive plant. If individual plants are appearing in a new area, focus on early removal of those before they seed and spread. If an invasion has already occurred, start on the periphery and move towards the centre, to first contain the invasion and then reduce its footprint.

b) Deciding what action to take, and when

Circumstances	Method	When	Notes or Caveats
Large patches of seedlings	Cutting with a weed-eater	In the summer*, at least 3 years after removing mature plants	• CAUTION: This method releases vapours that can cause respiratory and skin irritation. **Wear protective gear**, including gloves, goggles and an adequate breathing mask. Ensure others without protective gear are not in the vicinity. • This is less labour-intensive than hoeing or pulling, and causes less soil disturbance than these other methods • Damage can occur to native plants, and the duff layer may be swept away, exposing the bare soil • Seed or plant afterwards with native species
Medium-sized to smaller-sized patches of seedlings	Cutting the stem with a hand tool (grass whip, weed whip, or hedge shears)	In the summer*, at least 3 years after removing mature plants	• Wear protective clothing and avoid direct skin contact with the plant • This produces less of the toxic vapour than a weed-eater and has less impact on the duff layer, but this is more also labour-intensive • Seed or plant afterwards with native species • Cut below the lowest point where leaves occur • Hedge shears can get at places where the swinging blade of a grass or weed whip cannot (i.e. under dense shrub)
Individual seedlings or shrubs (pre-invasion) to small patches of seedlings or scattered young shrubs	Pulling	When the soil is moist, before the plants go to seed	• Wear protective clothing and avoid direct skin contact with the plant • Try to cause minimal soil disturbance (plants under 30 cm are generally easy to pull and doing so results in little soil disturbance) and avoid breaking the stem off above ground • Probably too labour-intensive to be used on large patches of plants unless a large labour pool is available • Seed or plant afterwards with native species

Circumstances	Method	When	Notes or Caveats
Mature plants and young shrubs, in any size of invasion (small to large)	Cutting the stem below the soil line	In the summer*	• Protective clothing should be worn, and avoid direct skin contact with the plant • Cut the bottom of the stem where there is an obvious colour change between stem and root. The easiest method: push or kick bypass loppers (these have the sharpest points; others are too blunt) into the ground at the base of the plant and close them to cut the stem below ground. Then inspect the cut stem for the colour change if you are unsure that the cut was low enough (the usual result is a diagonal cut that bisects the area of colour change, made quickly and with minimal soil disturbance). • Seed or plant afterwards with native species • If the invasion is large, expect dense germination from the seed bank after treatment and refrain from planting native species until after the initial pulse of Daphne germination (which usually occurs within the first two to three years). Treat the initial pulse as described above for seedlings.

* These methods are known to work in the summer. While they may also work at other times, there are currently no data for their success in other seasons.

In deciding which method(s) to choose, also consider:

- Your budget to acquire the necessary tools and equipment for the methods chosen,
- Worker health and safety and the need to comply with WorkSafe BC regulations,
- The health and safety of others nearby (other workers, bystanders, neighbours),
- The number and skill level of the people that will be assisting you, and
- The long term commitment required for successful weed management.

Control methods should be followed by a planting or seeding treatment in order to speed up re-establishment of native species. Consult with someone knowledgeable about this first; ensure that your plant and seed stock originate from sources that follow ethical guidelines; and take genetic issues into consideration. It is advisable to monitor the treated area afterwards to ensure that whatever native species have been seeded or planted have established successfully.

c) Deciding how to dispose of dead plant material

Dead plant material from this species should be removed from the site for safe disposal, and should be transported off-site wrapped in tarps to prevent the seeds from being distributed en route. Never transport Daphne cuttings or plants inside an enclosed vehicle because noxious compounds in the bark, leaves and fruit can cause respiratory irritation. For the same reason, Daphne should never be burned. It may be composted, but be aware that the compost will likely have viable seeds and should be treated appropriately to avoid dispersal to new areas.

d) Recognizing uncertainty

In making these decisions, there will be things you are unsure about. This is normal, and should not cause undue concern. The important thing is to be *aware* of the things you are most uncertain about, document them, and plan your actions in a manner that will help you learn and reduce this uncertainty.

Acknowledgements: developed from Webb et al. 2006,[1] and with the assistance of Conan Webb.

[1] Webb, C., M. Campbell, T. Kohler, D. McPhie and M. MacCarl. 2006. Control Methods for *Daphne laureola* Seedlings. Chapter 3.1, in: Species and Ecosystems at Risk; Fort Rodd Hill and Fisgard Lighthouse National Historic Sites of Canada, Summer 2006. Prepared by the Western and Northern Service Centre, Parks Canada, 38 pp + viii.

Ecological Restoration In Progress

Invasive Species Removal

Species: ***Daphne laureola***, aka Spurge-Laurel

Diagnostic features: Evergreen shrub. Grows from 0.4 to 1.4 m tall on average. Narrow, pointed, semi-glossy leaves. Clusters of small black berries under leaves in late spring/early summer.

History: Native to Europe and brought over as an ornamental garden plant. After *Daphne* escaped the garden it began to colonize rapidly and is a known invasive species in Victoria and on Vancouver Island. Also known as Spurge-laurel, this shrub chokes out native vegetation and speads quickly. Some birds favor the berries and following digestion, naturally disperse this invasive plant.

Ecosystem: Burnside Corner Park hosts mixed scrubby Garry Oak *(Quercus garryana)* and mature Douglas-Fir *(Psuedotsuga menziesii)* forest with several rock outcrop microsystems with particular Garry Oak species that only grow in those conditions.

Best management practices for *Daphne laureola*,
1. Young plants (< 50 cm tall) - pull by hand* when soil is moist
2. Mature plants (>50 cm tall) - cut below root collar in summer when dry
**always wear gloves, long-sleeves/pants when handling Daphne*

WARNING! This plant produces toxic sap that may cause irritation upon contact with skin. All parts of this plant are poisonous if ingested.

Interested in Volunteering with Invasive Species Removal? Get in contact with Jennifer Hebb, Restoration Coordinator for Portage Park by email to jenniferkhebb@gmail.com, or by phone at (250) 588-7919.

Town of View Royal website - viewroyal.ca
View Royal Parks Restoration website - restorationviewroyal.wordpress.com

Format: UTM M/D/Y H:M:S -4.00 hrs Datum[078]: NAD83

ID	Name	Date Time	Zone	Zone	Easting	Northing	Altitude	Species	DBH	Decay	Invasive
BCP-	114	27-JUL-16 11:0	10	U	467198	5368103	32.1	Apple	0.09	1	
BCP-	194	28-JUL-16 10:5	10	U	467187	5368061	28.5	Apple	0.27	1	
BCP-	257	28-JUL-16 12:5	10	U	467172	5368048	18.6	Apple	0.333	1	
BCP-	258	28-JUL-16 12:5	10	U	467171	5368048	13.1	Apple	0.423	1	
BCP-	263	28-JUL-16 1:01	10	U	467179	5368055	21.3	Apple	0.602	1	
BCP-	289	30-JUL-16 10:0	10	U	467130	5368060	30.6	Apple	0.124	2	
BCP-	290	30-JUL-16 10:0	10	U	467130	5368059	30.9	Apple	0.11	2	
BCP-	291	30-JUL-16 10:0	10	U	467130	5368059	30.9	Apple	0.115	2	
BCP-	292	30-JUL-16 10:0	10	U	467130	5368059	30.9	Apple	0.154	1	
BCP-	293	30-JUL-16 10:0	10	U	467131	5368059	30.9	Apple	0.1	1	
BCP-	294	30-JUL-16 10:0	10	U	467130	5368059	30.6	Apple	0.105	1	
BCP-	326	30-JUL-16 10:4	10	U	467143	5368042	30.2	Apple	0.498	1	
BCP-	330	30-JUL-16 10:5	10	U	467147	5368044	29	Apple	0.248	1	
BCP-	381	30-JUL-16 12:2	10	U	467130	5368045	15.3	Apple	0.054	2	
BCP-	383	30-JUL-16 12:2	10	U	467130	5368044	16	Apple	0.04	1	
BCP-	400	31-JUL-16 9:32	10	U	467136	5368105	30.4	Apple	0.274	2	
BCP-	438	31-JUL-16 10:3	10	U	467122	5368053	28.2	Apple	0.03	1	
BCP-	439	31-JUL-16 10:3	10	U	467123	5368049	26.8	Apple	0.027	1	
BCP-	445	31-JUL-16 10:4	10	U	467119	5368047	22.5	Apple	0.18	1	
BCP-	446	31-JUL-16 10:4	10	U	467119	5368045	22.2	Apple	0.138	1	
BCP-	447	31-JUL-16 10:4	10	U	467120	5368045	22	Apple	0.11	1	
BCP-	491	31-JUL-16 12:2	10	U	467124	5368152	39.5	Apple	0.19	2	
BCP-	188	28-JUL-16 10:3	10	U	467166	5368066	33.3	B. Hawth	0.24	1	
BCP-	242	28-JUL-16 12:3	10	U	467163	5368065	0.8	B. Hawth	0.15	1	
BCP-	243	28-JUL-16 12:3	10	U	467169	5368063	4	B. Hawth	0.355	1	
BCP-	278	30-JUL-16 9:40	10	U	467136	5368091	35	B. Hawth	0.114	1	
BCP-	279	30-JUL-16 9:41	10	U	467137	5368090	34.5	B. Hawth	0.311	1	
BCP-	286	30-JUL-16 9:56	10	U	467138	5368066	32.6	B. Hawth	0.282	1	
BCP-	287	30-JUL-16 9:56	10	U	467139	5368066	32.6	B. Hawth	0.298	1	
BCP-	346	30-JUL-16 11:4	10	U	467147	5368104	25.4	B. Hawth	0.133	1	
BCP-	386	31-JUL-16 9:09	10	U	467149	5368121	31.8	B. Hawth	0.12	1	
BCP-	387	31-JUL-16 9:14	10	U	467142	5368120	28.5	B. Hawth	0.1	2	
BCP-	388	31-JUL-16 9:14	10	U	467142	5368120	28.5	B. Hawth	0.25	1	
BCP-	389	31-JUL-16 9:15	10	U	467142	5368120	28.5	B. Hawth	0.462	1	

BCP-	390	31-JUL-16 9:15	10	U	467142	5368119	28.5	B. Hawth	0.345	1
BCP-	391	31-JUL-16 9:16	10	U	467142	5368119	28.5	B. Hawth	0.214	1
BCP-	393	31-JUL-16 9:22	10	U	467142	5368117	29.7	B. Hawth	0.105	2
BCP-	394	31-JUL-16 9:24	10	U	467141	5368115	30.2	B. Hawth	0.084	1
BCP-	395	31-JUL-16 9:25	10	U	467136	5368112	30.2	B. Hawth	0.16	1
BCP-	396	31-JUL-16 9:26	10	U	467133	5368106	35	B. Hawth	0.13	1
BCP-	412	31-JUL-16 9:54	10	U	467122	5368093	29	B. Hawth	0.143	1
BCP-	413	31-JUL-16 9:54	10	U	467122	5368093	29	B. Hawth	0.15	1
BCP-	458	31-JUL-16 11:2(	10	U	467136	5368138	23	B. Hawth	0.292	1
BCP-	469	31-JUL-16 11:4	10	U	467140	5368108	23.9	B. Hawth	0.192	1
BCP-	470	31-JUL-16 11:4	10	U	467140	5368108	23.9	B. Hawth	0.123	1
BCP-	514	01-AUG-16 9:48	10	U	467121	5368129	36.4	B. Hawth	0.28	1
BCP-	515	01-AUG-16 9:5(	10	U	467127	5368120	35.9	B. Hawth	0.083	1
BCP-	642	01-AUG-16 12:5	10	U	467081	5368079	32.1	B. Hawth	0.118	2
BCP-	643	01-AUG-16 12:5	10	U	467076	5368080	33.8	B. Hawth	0.225	1
BCP-	666	01-AUG-16 1:1	10	U	467072	5368070	30.4	B. Hawth	0.21	1
BCP-	670	02-AUG-16 8:5	10	U	467074	5368092	26.8	B. Hawth	0.41	1
BCP-	671	02-AUG-16 8:5	10	U	467073	5368091	25.1	B. Hawth	0.29	1
BCP-	672	02-AUG-16 8:5	10	U	467073	5368091	25.4	B. Hawth	0.26	1
BCP-	674	02-AUG-16 8:5	10	U	467070	5368101	25.1	B. Hawth	0.28	1
BCP-	675	02-AUG-16 8:5	10	U	467071	5368102	25.1	B. Hawth	0.34	1
BCP-	676	02-AUG-16 8:5	10	U	467073	5368104	26.3	B. Hawth	0.22	1
BCP-	677	02-AUG-16 8:5	10	U	467075	5368105	25.6	B. Hawth	0.519	1
BCP-	682	02-AUG-16 9:0	10	U	467069	5368093	25.8	B. Hawth	0.161	2
BCP-	685	02-AUG-16 9:0	10	U	467068	5368083	27.3	B. Hawth	0.084	3
BCP-	686	02-AUG-16 9:1(	10	U	467068	5368083	27	B. Hawth	0.09	2
BCP-	689	02-AUG-16 9:1	10	U	467067	5368083	25.6	B. Hawth	0.05	2
BCP-	691	02-AUG-16 9:1	10	U	467061	5368085	27.3	B. Hawth	0.132	2
BCP-	692	02-AUG-16 9:1	10	U	467061	5368083	27.8	B. Hawth	0.09	1
BCP-	694	02-AUG-16 9:1	10	U	467065	5368073	25.1	B. Hawth	0.06	2
BCP-	698	02-AUG-16 9:2(	10	U	467065	5368071	23.9	B. Hawth	0.16	2
BCP-	59	22-JUL-16 2:35	10	U	467207	5368142	32.6	Big-Leaf	0.017	1
BCP-	98	27-JUL-16 10:4	10	U	467212	5368106	35	Big-Leaf	0.226	1
BCP-	241	28-JUL-16 12:3	10	U	467162	5368067	-1.1	Big-Leaf	0.27	1
BCP-	511	01-AUG-16 9:4	10	U	467124	5368133	38.3	Big-Leaf	0.385	1
BCP-	30	22-JUL-16 1:23	10	U	467216	5368129	35	CASCAR/	0.01	5

BCP-	375	30-JUL-16 12:2(	10	U	467130	5368055	10.2	CASCARA	0.238	1
BCP-	376	30-JUL-16 12:2(	10	U	467130	5368055	10.7	CASCARA	0.08	1
BCP-	8	22-JUL-16 11:4!	10	U	467175	5368123	23.7	DF	2.51	1
BCP-	9	22-JUL-16 11:5:	10	U	467171	5368128	16.9	DF	1.95	1
BCP-	10	22-JUL-16 11:5:	10	U	467172	5368128	17.2	DF	0.458	1
BCP-	11	22-JUL-16 12:0:	10	U	467173	5368122	18.4	DF	1.595	2
BCP-	12	22-JUL-16 12:0(	10	U	467176	5368120	20.8	DF	2.36	1
BCP-	15	22-JUL-16 12:2!	10	U	467186	5368128	28.2	DF	0.91	9
BCP-	19	22-JUL-16 12:4(	10	U	467198	5368116	37.6	DF	2.86	2
BCP-	20	22-JUL-16 12:5(	10	U	467193	5368131	36.4	DF	1.39	8
BCP-	21	22-JUL-16 12:5!	10	U	467194	5368124	34	DF	1.88	1
BCP-	22	22-JUL-16 12:5(	10	U	467191	5368120	33.5	DF	1.14	1
BCP-	23	22-JUL-16 1:04:	10	U	467196	5368129	29	DF	1.481	2
BCP-	24	22-JUL-16 1:05:	10	U	467201	5368131	34.3	DF	1.68	2
BCP-	25	22-JUL-16 1:07:	10	U	467202	5368128	35.2	DF	1.755	1
BCP-	26	22-JUL-16 1:08:	10	U	467203	5368130	35.2	DF	0.621	1
BCP-	27	22-JUL-16 1:09:	10	U	467201	5368126	24.4	DF	1.418	1
BCP-	28	22-JUL-16 1:20:	10	U	467209	5368125	32.1	DF	1.852	1
BCP-	29	22-JUL-16 1:22:	10	U	467209	5368129	35.9	DF	0.593	1
BCP-	31	22-JUL-16 1:24:	10	U	467219	5368129	29.4	DF	1.658	2
BCP-	32	22-JUL-16 1:33:	10	U	467211	5368128	33.3	DF	0.29	1
BCP-	33	22-JUL-16 1:33:	10	U	467213	5368134	31.1	DF	0.35	1
BCP-	35	22-JUL-16 1:36:	10	U	467224	5368138	29.7	DF	0.345	1
BCP-	36	22-JUL-16 1:40:	10	U	467216	5368139	33.3	DF	3.155	1
BCP-	37	22-JUL-16 1:42:	10	U	467218	5368147	32.6	DF	1.485	1
BCP-	38	22-JUL-16 1:43:	10	U	467221	5368148	33.5	DF	1.96	1
BCP-	39	22-JUL-16 1:48:	10	U	467218	5368147	34.3	DF	2.375	1
BCP-	40	22-JUL-16 1:49:	10	U	467215	5368146	29.2	DF	1.13	1
BCP-	41	22-JUL-16 1:50:	10	U	467217	5368153	29.7	DF	2.242	1
BCP-	44	22-JUL-16 2:03:	10	U	467212	5368160	37.4	DF	0.916	1
BCP-	48	22-JUL-16 2:10:	10	U	467224	5368157	24.9	DF	1.8	1
BCP-	50	22-JUL-16 2:14:	10	U	467230	5368153	25.1	DF	0.335	1
BCP-	51	22-JUL-16 2:14:	10	U	467230	5368153	25.4	DF	1.598	1
BCP-	52	22-JUL-16 2:17:	10	U	467231	5368154	25.4	DF	1.113	1 Ivy climbing
BCP-	55	22-JUL-16 2:23:	10	U	467229	5368169	25.4	DF	2.208	2

BCP-	56	22-JUL-16 2:26	10	U	467228	5368175	26.3	DF	3.3	1 E. Ivy starting up North Side of Tree
BCP-	57	22-JUL-16 2:27	10	U	467232	5368183	27.5	DF	2.636	1
BCP-	60	22-JUL-16 2:35	10	U	467205	5368141	31.6	DF	1.265	1
BCP-	61	22-JUL-16 2:35	10	U	467204	5368142	31.6	DF	1.189	1
BCP-	62	22-JUL-16 2:39	10	U	467208	5368132	34.7	DF	2.39	1
BCP-	63	26-JUL-16 1:23	10	U	467238	5368182	41	DF	0.954	1 Ivy on North facing side
BCP-	64	26-JUL-16 1:23	10	U	467240	5368184	40.5	DF	3.4	1
BCP-	65	26-JUL-16 1:27	10	U	467236	5368178	38.6	DF	1.25	1
BCP-	67	26-JUL-16 1:29	10	U	467243	5368161	29.4	DF	1.24	2
BCP-	68	26-JUL-16 1:31	10	U	467238	5368163	27	DF	1.85	1
BCP-	69	26-JUL-16 1:32	10	U	467236	5368169	29	DF	3.488	2
BCP-	73	26-JUL-16 1:41	10	U	467241	5368149	29	DF	3.345	1
BCP-	75	26-JUL-16 1:43	10	U	467238	5368144	27.8	DF	1.158	2
BCP-	79	26-JUL-16 1:51	10	U	467233	5368137	32.8	DF	0.85	2
BCP-	80	26-JUL-16 1:51	10	U	467234	5368136	34.5	DF	1.845	2
BCP-	84	26-JUL-16 2:00	10	U	467223	5368118	23	DF	2.464	2
BCP-	85	26-JUL-16 2:01	10	U	467222	5368119	27.5	DF	0.93	2
BCP-	86	26-JUL-16 2:01	10	U	467222	5368119	29.9	DF	1.553	2
BCP-	87	26-JUL-16 2:02	10	U	467221	5368116	35.2	DF	0.153	2
BCP-	88	26-JUL-16 2:03	10	U	467220	5368120	39.8	DF	0.333	3
BCP-	89	26-JUL-16 2:03	10	U	467217	5368118	38.6	DF	0.68	1
BCP-	91	26-JUL-16 2:04	10	U	467215	5368116	37.4	DF	2.4	1
BCP-	92	27-JUL-16 10:35	10	U	467209	5368115	40.3	DF	2.123	1
BCP-	93	27-JUL-16 10:37	10	U	467205	5368107	39.3	DF	0.636	1
BCP-	94	27-JUL-16 10:38	10	U	467207	5368112	38.6	DF	0.534	1
BCP-	96	27-JUL-16 10:39	10	U	467208	5368111	36.9	DF	0.331	1
BCP-	97	27-JUL-16 10:40	10	U	467214	5368112	32.6	DF	2.675	1
BCP-	99	27-JUL-16 10:43	10	U	467212	5368105	35.7	DF	0.48	1
BCP-	101	27-JUL-16 10:45	10	U	467213	5368101	37.4	DF	0.545	1
BCP-	102	27-JUL-16 10:48	10	U	467207	5368099	35.5	DF	2.735	1
BCP-	103	27-JUL-16 10:49	10	U	467210	5368099	35.5	DF	0.999	1
BCP-	104	27-JUL-16 10:50	10	U	467213	5368095	37.1	DF	1.924	1
BCP-	106	27-JUL-16 10:57	10	U	467207	5368087	34	DF	0.544	1
BCP-	108	27-JUL-16 10:59	10	U	467200	5368094	34	DF	2.105	1
BCP-	109	27-JUL-16 11:00	10	U	467200	5368094	34	DF	0.747	1

BCP-	110	27-JUL-16	11:0	10	U	467198	5368093	35.7	DF	2.394	1	
BCP-	111	27-JUL-16	11:0	10	U	467198	5368093	39.8	DF	0.393	1	
BCP-	112	27-JUL-16	11:0	10	U	467198	5368098	37.4	DF	0.275	1	
BCP-	113	27-JUL-16	11:0	10	U	467199	5368099	34.7	DF	0.355	1	
BCP-	115	27-JUL-16	11:1	10	U	467190	5368097	30.2	DF	1.892	1	
BCP-	116	27-JUL-16	11:1	10	U	467195	5368091	30.2	DF	0.433	1	
BCP-	117	27-JUL-16	11:1	10	U	467194	5368093	27.8	DF	1.66	1	
BCP-	118	27-JUL-16	11:1	10	U	467188	5368094	25.1	DF	0.762	1	
BCP-	119	27-JUL-16	11:1	10	U	467186	5368097	24.2	DF	2.361	1	English Ivy on S-facing side, upto ~ 4 m
BCP-	121	27-JUL-16	11:2	10	U	467188	5368091	21	DF	2.285	1	
BCP-	122	27-JUL-16	11:2	10	U	467189	5368091	21.3	DF	1.176	1	
BCP-	123	27-JUL-16	11:2	10	U	467190	5368089	22.7	DF	0.763	1	
BCP-	124	27-JUL-16	11:2	10	U	467190	5368089	22.5	DF	1.11	1	
BCP-	125	27-JUL-16	11:2	10	U	467203	5368081	25.4	DF	2.79	1	
BCP-	126	27-JUL-16	11:2	10	U	467202	5368078	25.6	DF	1.932	1	
BCP-	127	27-JUL-16	11:3	10	U	467199	5368086	27	DF	2.39	1	
BCP-	137	27-JUL-16	11:4	10	U	467216	5368069	24.2	DF	0.5	8	
BCP-	139	27-JUL-16	11:5	10	U	467209	5368058	19.1	DF	1.315	8	
BCP-	140	27-JUL-16	11:5	10	U	467209	5368061	20.1	DF	2.41	1	
BCP-	147	27-JUL-16	12:0	10	U	467200	5368067	13.8	DF	1.42	1	
BCP-	148	27-JUL-16	12:0	10	U	467200	5368069	15.5	DF	1.76	1	
BCP-	149	27-JUL-16	12:0	10	U	467202	5368067	16.2	DF	1.249	1	
BCP-	150	27-JUL-16	12:0	10	U	467197	5368067	18.4	DF	3.302	1	
BCP-	151	27-JUL-16	12:0	10	U	467195	5368073	20.6	DF	2.7	1	
BCP-	153	27-JUL-16	12:2	10	U	467197	5368075	25.4	DF	2.774	1	
BCP-	154	27-JUL-16	12:2	10	U	467202	5368076	16.7	DF	1.863	1	
BCP-	155	27-JUL-16	12:3	10	U	467189	5368109	25.8	DF	4.3	1	
BCP-	158	27-JUL-16	12:3	10	U	467184	5368095	24.4	DF	1.9	1	
BCP-	164	27-JUL-16	12:5	10	U	467178	5368079	16.9	DF	2.4	1	
BCP-	165	27-JUL-16	12:5	10	U	467177	5368080	18.2	DF	2.78	1	
BCP-	166	27-JUL-16	12:5	10	U	467182	5368079	22.2	DF	1.68	1	
BCP-	167	27-JUL-16	12:5	10	U	467175	5368078	23.4	DF	3.295	1	
BCP-	168	27-JUL-16	12:5	10	U	467175	5368079	23.2	DF	2.88	1	
BCP-	169	27-JUL-16	12:5	10	U	467186	5368074	29.4	DF	1.58	1	
BCP-	171	27-JUL-16	1:00	10	U	467177	5368068	21.5	DF	2.815	1	

BCP-	175	28-JUL-16	10:1	10	U	467174	5368109	40.7 DF	1.361	2
BCP-	176	28-JUL-16	10:1	10	U	467177	5368097	38.3 DF	0.43	1
BCP-	177	28-JUL-16	10:1	10	U	467177	5368097	38.3 DF	1.571	1
BCP-	178	28-JUL-16	10:1	10	U	467172	5368097	37.9 DF	1.446	1
BCP-	179	28-JUL-16	10:2	10	U	467164	5368087	34.7 DF	3.467	1
BCP-	190	28-JUL-16	10:4	10	U	467174	5368062	35.7 DF	0.285	1
BCP-	202	28-JUL-16	11:3	10	U	467175	5368119	22.2 DF	0.47	1
BCP-	203	28-JUL-16	11:3	10	U	467174	5368115	22 DF	1.682	1
BCP-	204	28-JUL-16	11:3	10	U	467170	5368118	23.7 DF	1.7	1
BCP-	205	28-JUL-16	11:3	10	U	467168	5368117	24.9 DF	0.61	2
BCP-	206	28-JUL-16	11:3	10	U	467167	5368115	25.1 DF	0.221	3
BCP-	207	28-JUL-16	11:4	10	U	467166	5368107	22 DF	0.92	1
BCP-	208	28-JUL-16	11:4	10	U	467168	5368106	19.6 DF	0.339	1
BCP-	209	28-JUL-16	11:4	10	U	467169	5368106	19.8 DF	1.845	1
BCP-	210	28-JUL-16	11:4	10	U	467169	5368106	20.1 DF	1.78	1
BCP-	211	28-JUL-16	11:4	10	U	467164	5368108	19.1 DF	2.113	1
BCP-	212	28-JUL-16	11:4	10	U	467164	5368105	20.8 DF	2.6	1
BCP-	214	28-JUL-16	11:5	10	U	467167	5368100	24.4 DF	1.53	1
BCP-	215	28-JUL-16	11:5	10	U	467167	5368093	24.6 DF	3.449	2
BCP-	226	28-JUL-16	12:1	10	U	467152	5368073	21 DF	2.69	1
BCP-	232	28-JUL-16	12:2	10	U	467157	5368068	22.7 DF	2.251	1
BCP-	244	28-JUL-16	12:4	10	U	467167	5368063	9.3 DF	2.75	1
BCP-	248	28-JUL-16	12:4	10	U	467167	5368062	10 DF	1.462	1
BCP-	251	28-JUL-16	12:4	10	U	467168	5368062	11.2 DF	2.238	2
BCP-	264	28-JUL-16	1:03	10	U	467184	5368054	21 DF	1.656	3
BCP-	266	28-JUL-16	1:07	10	U	467186	5368060	21.8 DF	1.155	1
BCP-	267	30-JUL-16	9:21	10	U	467161	5368108	27 DF	2.649	2
BCP-	271	30-JUL-16	9:27	10	U	467149	5368099	29.4 DF	2.19	1
BCP-	272	30-JUL-16	9:27	10	U	467149	5368096	30.4 DF	2.76	1
BCP-	299	30-JUL-16	10:1	10	U	467132	5368046	31.4 DF	0.632	7
BCP-	300	30-JUL-16	10:1	10	U	467131	5368046	31.1 DF	0.638	2
BCP-	302	30-JUL-16	10:2	10	U	467130	5368043	32.3 DF	0.494	1
BCP-	303	30-JUL-16	10:2	10	U	467131	5368043	32.3 DF	0.709	1
BCP-	327	30-JUL-16	10:5	10	U	467146	5368043	29.9 DF	0.455	2
BCP-	328	30-JUL-16	10:5	10	U	467146	5368043	29.9 DF	0.28	1
BCP-	329	30-JUL-16	10:5	10	U	467146	5368043	29.9 DF	0.875	1

BCP-	345	30-JUL-16 11:4	10	U	467147	5368105	25.1	DF	2.241	1	
BCP-	347	30-JUL-16 11:4	10	U	467147	5368104	25.1	DF	2.767	1	
BCP-	354	30-JUL-16 11:5	10	U	467134	5368093	18.9	DF	0.643	9	
BCP-	378	30-JUL-16 12:2	10	U	467132	5368049	13.3	DF	0.276	8	
BCP-	379	30-JUL-16 12:2	10	U	467132	5368049	13.3	DF	0.75	2	
BCP-	380	30-JUL-16 12:2	10	U	467131	5368046	15.3	DF	0.103	1	
BCP-	382	30-JUL-16 12:2	10	U	467130	5368045	15.7	DF	0.08	8	
BCP-	399	31-JUL-16 9:30	10	U	467135	5368104	31.1	DF	1.367	1	
BCP-	408	31-JUL-16 9:49	10	U	467121	5368096	28.2	DF	2.837	1	
BCP-	451	31-JUL-16 10:5	10	U	467108	5368042	21	DF	1.198	1	
BCP-	452	31-JUL-16 10:5	10	U	467108	5368042	21	DF	0.962	2	
BCP-	455	31-JUL-16 11:2	10	U	467135	5368129	23.2	DF	2.913	2	English Ivy around trunk and base, likely killing it. Cut off as much as possible.
BCP-	465	31-JUL-16 11:3	10	U	467130	5368125	23	DF	0.983	1	
BCP-	467	31-JUL-16 11:3	10	U	467132	5368119	23.9	DF	1.188	8	
BCP-	471	31-JUL-16 11:4	10	U	467129	5368106	23.4	Df	2.28	1	
BCP-	472	31-JUL-16 11:4	10	U	467129	5368106	23.7	DF	1.4	1	
BCP-	474	31-JUL-16 11:5	10	U	467128	5368106	24.9	DF	1.95	1	
BCP-	475	31-JUL-16 11:5	10	U	467128	5368106	24.9	DF	1.87	1	
BCP-	482	31-JUL-16 12:0	10	U	467112	5368071	24.2	DF	3.424	1	
BCP-	485	31-JUL-16 12:1	10	U	467149	5368133	25.6	DF	3.225	1	
BCP-	499	31-JUL-16 12:3	10	U	467123	5368147	35.9	DF	2.573	1	
BCP-	500	31-JUL-16 12:3	10	U	467121	5368148	32.3	DF	2.12	1	
BCP-	502	31-JUL-16 12:3	10	U	467126	5368142	26.8	DF	0.806	1	
BCP-	516	01-AUG-16 9:5	10	U	467127	5368117	36.2	DF	3.498	1	
BCP-	517	01-AUG-16 9:5	10	U	467123	5368116	35.5	DF	0.439	1	
BCP-	539	01-AUG-16 10:1	10	U	467113	5368093	35.2	DF	3.414	2	
BCP-	547	01-AUG-16 10:2	10	U	467102	5368073	32.8	DF	3.137	1	
BCP-	562	01-AUG-16 11:0	10	U	467113	5368126	30.6	DF	2.41	1	
BCP-	563	01-AUG-16 11:0	10	U	467106	5368131	29.2	DF	2.77	1	
BCP-	564	01-AUG-16 11:0	10	U	467098	5368133	31.1	DF	2.07	1	
BCP-	565	01-AUG-16 11:0	10	U	467099	5368129	28	DF	2.11	1	
BCP-	574	01-AUG-16 11:1	10	U	467097	5368116	23.9	DF	1.28	1	
BCP-	576	01-AUG-16 11:1	10	U	467093	5368116	24.2	DF	1.03	3	
BCP-	577	01-AUG-16 11:2	10	U	467093	5368116	24.2	DF	1.83	2	

BCP-	583	01-AUG-16 11:2	10	U	467100	5368109	24.2	DF	1.523	2
BCP-	588	01-AUG-16 11:3	10	U	467102	5368098	25.8	DF	3.7	3
BCP-	618	01-AUG-16 12:1	10	U	467095	5368105	25.6	DF	2.49	2
BCP-	621	01-AUG-16 12:1	10	U	467095	5368105	25.4	DF	2.974	1
BCP-	629	01-AUG-16 12:3	10	U	467095	5368091	25.6	DF	1.875	2
BCP-	631	01-AUG-16 12:3	10	U	467093	5368088	27.5	DF	1.227	3
BCP-	632	01-AUG-16 12:3	10	U	467083	5368089	37.1	DF	1.514	4
BCP-	633	01-AUG-16 12:4	10	U	467079	5368087	34.5	DF	1.429	9
BCP-	634	01-AUG-16 12:4	10	U	467083	5368086	33.1	DF	2.245	3
BCP-	635	01-AUG-16 12:4	10	U	467088	5368078	32.1	DF	2.11	3
BCP-	649	01-AUG-16 1:0(	10	U	467080	5368076	30.6	DF	2.14	1
BCP-	667	02-AUG-16 8:43	10	U	467084	5368117	27	DF	1.72	7
BCP-	668	02-AUG-16 8:45	10	U	467083	5368107	24.6	DF	1.6	7
BCP-	669	02-AUG-16 8:45	10	U	467083	5368106	24.6	DF	1.84	7
BCP-	679	02-AUG-16 9:03	10	U	467068	5368095	25.8	DF	1.45	1
BCP-	735	02-AUG-16 9:5(	10	U	467082	5368107	32.1	DF	1.42	7
BCP-	172	27-JUL-16 1:02	10	U	467175	5368068	22.2	E. Hawth	0.258	1
BCP-	173	27-JUL-16 1:04	10	U	467182	5368108	30.9	E. Hawth	0.117	1
BCP-	182	28-JUL-16 10:2	10	U	467165	5368082	36.7	E. Hawth	0.42	1
BCP-	200	28-JUL-16 11:0	10	U	467198	5368053	26.1	E. Hawth	0.012	1
BCP-	255	28-JUL-16 12:5	10	U	467160	5368044	17.7	E. Hawth	0.006	1
BCP-	259	28-JUL-16 12:58	10	U	467175	5368053	24.4	E. Hawth	0.012	1
BCP-	297	30-JUL-16 10:1	10	U	467132	5368046	30.6	E. Hawth	0.05	1
BCP-	301	30-JUL-16 10:2	10	U	467130	5368044	32.3	E. Hawth	0.06	1
BCP-	320	30-JUL-16 10:4	10	U	467138	5368036	30.2	E. Hawth	0.04	1
BCP-	321	30-JUL-16 10:4	10	U	467138	5368036	29.9	E. Hawth	0.08	1
BCP-	322	30-JUL-16 10:4	10	U	467140	5368035	30.2	E. Hawth	0.02	1
BCP-	323	30-JUL-16 10:4	10	U	467140	5368035	30.2	E. Hawth	0.05	1
BCP-	348	30-JUL-16 11:4(	10	U	467147	5368104	25.1	E. Hawth	0.151	1
BCP-	366	30-JUL-16 12:1	10	U	467133	5368068	10.5	E. Hawth	0.192	1
BCP-	384	30-JUL-16 12:3(	10	U	467127	5368044	18.6	E. Hawth	0.01	1
BCP-	385	30-JUL-16 12:3(	10	U	467124	5368043	18.9	E. Hawth	0.03	1
BCP-	442	31-JUL-16 10:4(	10	U	467120	5368043	29.9	E. Hawth	0.291	1
BCP-	611	01-AUG-16 11:5	10	U	467091	5368069	20.8	E. Hawth	0.01	2
BCP-	617	01-AUG-16 12:(	10	U	467093	5368047	17.9	E. Hawth	0.19	1
BCP-	636	01-AUG-16 12:4	10	U	467086	5368082	29.7	E. Hawth	0.115	1

BCP-	681	02-AUG-16 9:0	10	U	467069	5368094	25.1	E. Hawth	0.01	1
BCP-	34	22-JUL-16 1:34	10	U	467219	5368136	31.1	GF	0.816	1
BCP-	49	22-JUL-16 2:12	10	U	467225	5368156	25.4	GF	0.763	1
BCP-	66	26-JUL-16 1:29	10	U	467245	5368165	29.2	GF	2.36	1
BCP-	70	26-JUL-16 1:38	10	U	467236	5368174	34	GF	0.972	1
BCP-	71	26-JUL-16 1:40	10	U	467245	5368150	29.2	GF	0.29	7
BCP-	72	26-JUL-16 1:40	10	U	467244	5368151	29.7	GF	0.55	2
BCP-	74	26-JUL-16 1:42	10	U	467240	5368149	29	GF	1.14	1
BCP-	76	26-JUL-16 1:44	10	U	467235	5368141	31.1	GF	0.011	1
BCP-	77	26-JUL-16 1:49	10	U	467233	5368140	33.1	GF	2.13	1
BCP-	78	26-JUL-16 1:49	10	U	467235	5368139	31.4	GF	1.289	1
BCP-	81	26-JUL-16 1:52	10	U	467230	5368129	48.2	GF	0.491	1
BCP-	82	26-JUL-16 1:53	10	U	467233	5368137	36.7	GF	1.13	1
BCP-	83	26-JUL-16 1:59	10	U	467220	5368128	17.4	GF	0.61	1
BCP-	90	26-JUL-16 2:04	10	U	467211	5368108	38.8	GF	0.319	1
BCP-	95	27-JUL-16 10:38	10	U	467206	5368114	38.3	GF	0.506	1
BCP-	146	27-JUL-16 12:0	10	U	467198	5368061	15.5	GF	0.84	1
BCP-	183	28-JUL-16 10:2	10	U	467162	5368074	43.1	GF	0.55	2
BCP-	191	28-JUL-16 10:4	10	U	467178	5368059	27.3	GF	0.083	3
BCP-	193	28-JUL-16 10:48	10	U	467186	5368063	29.2	GF	0.46	1
BCP-	197	28-JUL-16 10:5	10	U	467195	5368055	26.3	GF	0.196	1
BCP-	234	28-JUL-16 12:2	10	U	467154	5368070	17.4	GF	0.537	1
BCP-	238	28-JUL-16 12:28	10	U	467161	5368060	5.9	GF	0.338	1
BCP-	239	28-JUL-16 12:28	10	U	467161	5368060	4	GF	0.537	1
BCP-	240	28-JUL-16 12:3	10	U	467162	5368066	-1.8	GF	0.464	1
BCP-	247	28-JUL-16 12:4	10	U	467167	5368062	9.7	GF	0.393	1
BCP-	260	28-JUL-16 12:58	10	U	467178	5368051	20.8	GF	0.237	1
BCP-	298	30-JUL-16 10:1	10	U	467132	5368046	30.9	GF	0.16	2
BCP-	450	31-JUL-16 10:5	10	U	467108	5368042	21.3	GF	0.2	1
BCP-	453	31-JUL-16 11:0	10	U	467108	5368046	20.6	GF	0.431	1
BCP-	454	31-JUL-16 11:2	10	U	467134	5368128	32.6	GF	0.675	1
BCP-	456	31-JUL-16 11:2	10	U	467138	5368138	23	GF	0.345	1
BCP-	457	31-JUL-16 11:2	10	U	467138	5368139	23.2	GF	0.369	1
BCP-	464	31-JUL-16 11:3	10	U	467129	5368125	22.7	GF	0.777	4
BCP-	490	31-JUL-16 12:2	10	U	467137	5368150	37.4	GF	1.33	1
BCP-	492	31-JUL-16 12:2	10	U	467124	5368153	39.5	GF	0.08	1

BCP-	494	31-JUL-16 12:2	10	U	467131	5368146	31.4	GF	0.751	2
BCP-	507	01-AUG-16 9:3	10	U	467131	5368138	40.5	GF	0.062	1
BCP-	730	02-AUG-16 9:4	10	U	467054	5368070	29.7	GF	0.098	1
BCP-	734	02-AUG-16 9:4	10	U	467053	5368081	30.6	GF	0.21	1
BCP-	1	22-JUL-16 11:2	10	U	467161	5368130	32.6	GO	0.355	1
BCP-	2	22-JUL-16 11:3	10	U	467157	5368128	35.2	GO	0.521	1
BCP-	3	22-JUL-16 11:3	10	U	467158	5368128	35	GO	0.668	1
BCP-	4	22-JUL-16 11:3	10	U	467166	5368133	34.3	GO	0.389	2
BCP-	5	22-JUL-16 11:3	10	U	467162	5368134	34	GO	0.495	1
BCP-	6	22-JUL-16 11:4	10	U	467160	5368132	33.5	GO	0.622	1
BCP-	7	22-JUL-16 11:4	10	U	467163	5368129	31.4	GO	0.289	1
BCP-	13	22-JUL-16 12:1	10	U	467186	5368124	20.6	GO	0.08	1
BCP-	14	22-JUL-16 12:1	10	U	467178	5368126	31.6	GO	0.214	1
BCP-	16	22-JUL-16 12:2	10	U	467185	5368129	29.2	GO	0.526	1 English Ivy starting to vine up tree
BCP-	17	22-JUL-16 12:2	10	U	467186	5368129	29	GO	0.278	1
BCP-	18	22-JUL-16 12:2	10	U	467193	5368135	23.2	GO	0.077	1
BCP-	42	22-JUL-16 1:59	10	U	467219	5368162	36.7	GO	0.741	1
BCP-	43	22-JUL-16 2:00	10	U	467219	5368160	37.1	GO	0.555	4
BCP-	45	22-JUL-16 2:04	10	U	467208	5368166	33.1	GO	0.373	2
BCP-	46	22-JUL-16 2:06	10	U	467217	5368164	32.3	GO	0.12	3
BCP-	47	22-JUL-16 2:01	10	U	467219	5368155	32.3	GO	0.84	2
BCP-	53	22-JUL-16 2:20	10	U	467229	5368167	22.7	GO	0.72	2 Ivy encroaching
BCP-	54	22-JUL-16 2:23	10	U	467228	5368168	24.4	GO	0.574	1
BCP-	58	22-JUL-16 2:30	10	U	467233	5368169	36.4	GO	0.343	1
BCP-	100	27-JUL-16 10:4	10	U	467212	5368101	36.4	GO	0.112	2
BCP-	105	27-JUL-16 10:5	10	U	467214	5368090	38.3	GO	0.162	1
BCP-	107	27-JUL-16 10:5	10	U	467205	5368092	33.8	GO	0.08	1
BCP-	120	27-JUL-16 11:1	10	U	467188	5368092	21.3	GO	0.341	1
BCP-	128	27-JUL-16 11:3	10	U	467208	5368090	37.9	GO	0.113	1
BCP-	129	27-JUL-16 11:3	10	U	467207	5368083	32.3	GO	0.157	1
BCP-	130	27-JUL-16 11:3	10	U	467210	5368092	31.4	GO	0.743	3
BCP-	131	27-JUL-16 11:4	10	U	467211	5368079	28.5	GO	0.42	1
BCP-	132	27-JUL-16 11:4	10	U	467212	5368083	28.5	GO	0.34	1
BCP-	133	27-JUL-16 11:4	10	U	467213	5368089	28.2	GO	0.2	1
BCP-	134	27-JUL-16 11:4	10	U	467217	5368084	28.5	GO	0.175	1

BCP-	135	27-JUL-16 11:4	10	U	467219	5368078	28.5	GO	0.315	3
BCP-	136	27-JUL-16 11:4	10	U	467218	5368073	25.8	GO	0.11	1
BCP-	138	27-JUL-16 11:5	10	U	467211	5368056	18.4	GO	0.185	1
BCP-	141	27-JUL-16 11:5	10	U	467204	5368054	11.2	GO	0.128	1
BCP-	142	27-JUL-16 11:5	10	U	467208	5368055	13.8	GO	0.055	1
BCP-	143	27-JUL-16 12:0	10	U	467198	5368061	17.7	GO	0.636	1
BCP-	144	27-JUL-16 12:0	10	U	467198	5368061	17.9	GO	0.688	1
BCP-	145	27-JUL-16 12:0	10	U	467199	5368062	18.4	GO	0.675	1
BCP-	152	27-JUL-16 12:2	10	U	467194	5368072	23.2	GO	0.414	1
BCP-	156	27-JUL-16 12:3	10	U	467187	5368099	29.9	GO	0.243	4
BCP-	157	27-JUL-16 12:3	10	U	467187	5368099	29.9	GO	0.452	1
BCP-	159	27-JUL-16 12:4	10	U	467179	5368091	24.6	GO	0.273	1
BCP-	160	27-JUL-16 12:4	10	U	467177	5368088	23.4	GO	0.175	1
BCP-	161	27-JUL-16 12:4	10	U	467175	5368084	24.6	GO	0.25	1
BCP-	162	27-JUL-16 12:4	10	U	467176	5368078	25.4	GO	0.199	4
BCP-	163	27-JUL-16 12:4	10	U	467175	5368077	25.6	GO	0.326	2
BCP-	170	27-JUL-16 12:5	10	U	467186	5368070	28	GO	0.405	2
BCP-	174	28-JUL-16 10:1	10	U	467172	5368113	43.1	GO	0.16	1
BCP-	180	28-JUL-16 10:2	10	U	467165	5368082	36.7	GO	0.382	1
BCP-	181	28-JUL-16 10:2	10	U	467164	5368082	36.7	GO	0.654	1
BCP-	184	28-JUL-16 10:2	10	U	467161	5368075	37.1	GO	0.09	2
BCP-	185	28-JUL-16 10:3	10	U	467162	5368075	32.1	GO	0.57	8
BCP-	186	28-JUL-16 10:3	10	U	467162	5368075	32.6	GO	0.765	1
BCP-	187	28-JUL-16 10:3	10	U	467165	5368066	33.5	GO	0.84	2
BCP-	189	28-JUL-16 10:4	10	U	467171	5368064	32.6	GO	0.53	2
BCP-	192	28-JUL-16 10:4	10	U	467186	5368063	29.4	GO	0.378	1
BCP-	195	28-JUL-16 10:5	10	U	467193	5368064	24.4	GO	0.53	2
BCP-	196	28-JUL-16 10:5	10	U	467194	5368063	24.2	GO	0.98	1
BCP-	198	28-JUL-16 10:5	10	U	467194	5368058	26.3	GO	0.288	2
BCP-	213	28-JUL-16 11:4	10	U	467166	5368104	23	GO	0.16	1
BCP-	216	28-JUL-16 11:5	10	U	467156	5368089	18.9	GO	0.685	1
BCP-	217	28-JUL-16 11:5	10	U	467154	5368086	15.5	GO	0.295	1
BCP-	218	28-JUL-16 12:0	10	U	467153	5368086	15.5	GO	0.234	1
BCP-	219	28-JUL-16 12:0	10	U	467147	5368081	18.2	GO	0.32	1
BCP-	220	28-JUL-16 12:0	10	U	467147	5368080	18.4	GO	0.19	4
BCP-	221	28-JUL-16 12:0	10	U	467147	5368082	19.4	GO	0.46	1

BCP-	222	28-JUL-16 12:0	10	U	467147	5368082	20.6	GO	0.271	1
BCP-	223	28-JUL-16 12:0	10	U	467146	5368079	20.6	GO	0.361	2
BCP-	224	28-JUL-16 12:0	10	U	467148	5368079	21	GO	0.675	1
BCP-	225	28-JUL-16 12:0	10	U	467154	5368078	24.2	GO	0.841	1
BCP-	227	28-JUL-16 12:1	10	U	467142	5368066	16.5	GO	0.765	2
BCP-	228	28-JUL-16 12:1	10	U	467147	5368075	18.4	GO	0.389	1
BCP-	229	28-JUL-16 12:1	10	U	467147	5368071	20.8	GO	0.899	1
BCP-	230	28-JUL-16 12:1	10	U	467150	5368070	24.6	GO	0.479	1
BCP-	231	28-JUL-16 12:1	10	U	467150	5368069	24.6	GO	0.25	8
BCP-	233	28-JUL-16 12:2	10	U	467151	5368068	18.4	GO	2.9	1
BCP-	235	28-JUL-16 12:2	10	U	467158	5368068	22.7	GO	0.483	7
BCP-	236	28-JUL-16 12:2	10	U	467161	5368065	21.3	GO	0.84	1
BCP-	237	28-JUL-16 12:2	10	U	467162	5368064	21	GO	0.809	1
BCP-	245	28-JUL-16 12:4	10	U	467167	5368063	9.3	GO	0.465	2
BCP-	246	28-JUL-16 12:4	10	U	467167	5368062	9.5	GO	0.688	1
BCP-	249	28-JUL-16 12:4	10	U	467167	5368062	10.2	GO	0.835	1
BCP-	254	28-JUL-16 12:5	10	U	467163	5368045	20.8	GO	0.731	1
BCP-	256	28-JUL-16 12:5	10	U	467157	5368051	19.8	GO	0.822	1
BCP-	261	28-JUL-16 1:00	10	U	467179	5368054	19.6	GO	0.97	1
BCP-	265	28-JUL-16 1:04	10	U	467185	5368059	20.8	GO	1.428	1
BCP-	268	30-JUL-16 9:23	10	U	467153	5368106	33.1	GO	0.36	1
BCP-	269	30-JUL-16 9:25	10	U	467158	5368098	32.3	GO	0.125	2
BCP-	270	30-JUL-16 9:27	10	U	467152	5368100	29.4	GO	0.598	2
BCP-	273	30-JUL-16 9:30	10	U	467154	5368092	35.5	GO	0.692	1
BCP-	274	30-JUL-16 9:32	10	U	467152	5368088	33.8	GO	1.145	4
BCP-	275	30-JUL-16 9:35	10	U	467151	5368087	33.8	GO	0.237	1
BCP-	276	30-JUL-16 9:37	10	U	467141	5368094	33.8	GO	1.99	1
BCP-	277	30-JUL-16 9:38	10	U	467137	5368092	34.7	GO	0.317	1
BCP-	281	30-JUL-16 9:45	10	U	467137	5368087	34.3	GO	0.696	1
BCP-	282	30-JUL-16 9:46	10	U	467138	5368086	34.5	GO	0.456	2
BCP-	283	30-JUL-16 9:48	10	U	467141	5368081	37.9	GO	0.428	4
BCP-	284	30-JUL-16 9:48	10	U	467140	5368080	38.8	GO	0.488	2
BCP-	285	30-JUL-16 9:51	10	U	467139	5368080	39.5	GO	0.457	2
BCP-	288	30-JUL-16 9:59	10	U	467131	5368068	31.6	GO	1.85	1
BCP-	295	30-JUL-16 10:1	10	U	467130	5368059	30.6	GO	0.134	1
BCP-	296	30-JUL-16 10:1	10	U	467138	5368052	30.9	GO	0.455	1

BCP-	304	30-JUL-16 10:28	10	U	467133	5368042	30.9	GO	0.825	1
BCP-	305	30-JUL-16 10:28	10	U	467133	5368042	30.9	GO	1.3	1
BCP-	306	30-JUL-16 10:28	10	U	467133	5368042	30.9	GO	0.584	1
BCP-	307	30-JUL-16 10:28	10	U	467133	5368042	30.6	GO	0.47	7
BCP-	308	30-JUL-16 10:28	10	U	467133	5368042	30.6	GO	0.76	1
BCP-	309	30-JUL-16 10:28	10	U	467133	5368042	30.6	GO	0.72	1
BCP-	310	30-JUL-16 10:28	10	U	467133	5368042	30.6	GO	0.73	1
BCP-	311	30-JUL-16 10:28	10	U	467133	5368042	30.6	GO	0.87	1
BCP-	312	30-JUL-16 10:28	10	U	467133	5368042	30.6	GO	0.975	1
BCP-	313	30-JUL-16 10:34	10	U	467131	5368041	28.7	GO	0.223	1
BCP-	319	30-JUL-16 10:43	10	U	467141	5368040	29.9	GO	0.181	1
BCP-	324	30-JUL-16 10:45	10	U	467143	5368037	31.1	GO	0.17	1
BCP-	325	30-JUL-16 10:47	10	U	467142	5368038	30.9	GO	0.05	1
BCP-	331	30-JUL-16 10:55	10	U	467153	5368046	25.4	GO	0.918	1
BCP-	332	30-JUL-16 10:55	10	U	467154	5368043	26.8	GO	1.283	1
BCP-	333	30-JUL-16 10:57	10	U	467155	5368049	26.8	GO	0.46	1
BCP-	334	30-JUL-16 10:59	10	U	467146	5368050	28.2	GO	2.527	1
BCP-	335	30-JUL-16 11:03	10	U	467151	5368040	21.8	GO	0.065	1
BCP-	336	30-JUL-16 11:30	10	U	467160	5368122	23.4	GO	0.222	1
BCP-	337	30-JUL-16 11:31	10	U	467160	5368119	25.8	GO	0.63	1
BCP-	338	30-JUL-16 11:32	10	U	467158	5368118	25.4	GO	0.128	1
BCP-	339	30-JUL-16 11:34	10	U	467153	5368115	24.6	GO	0.438	1
BCP-	340	30-JUL-16 11:36	10	U	467152	5368114	25.1	GO	0.3	1
BCP-	341	30-JUL-16 11:37	10	U	467151	5368109	27.8	GO	0.74	1
BCP-	342	30-JUL-16 11:37	10	U	467152	5368105	28.5	GO	0.354	1
BCP-	343	30-JUL-16 11:38	10	U	467150	5368105	28	GO	0.321	3
BCP-	344	30-JUL-16 11:39	10	U	467154	5368105	29.4	GO	0.2	3
BCP-	349	30-JUL-16 11:47	10	U	467147	5368101	25.1	GO	1.967	1
BCP-	350	30-JUL-16 11:49	10	U	467141	5368093	24.2	GO	0.316	2
BCP-	351	30-JUL-16 11:53	10	U	467134	5368094	19.1	GO	0.516	1
BCP-	352	30-JUL-16 11:53	10	U	467134	5368094	18.9	GO	1.09	1
BCP-	353	30-JUL-16 11:53	10	U	467134	5368094	18.9	GO	0.34	7
BCP-	355	30-JUL-16 11:58	10	U	467130	5368089	9.3	GO	0.215	7
BCP-	356	30-JUL-16 11:59	10	U	467130	5368089	9.5	GO	0.416	7
BCP-	357	30-JUL-16 12:00	10	U	467132	5368089	10.9	GO	0.7	1
BCP-	360	30-JUL-16 12:03	10	U	467132	5368087	11.9	GO	0.716	1

BCP-	361	30-JUL-16 12:0	10	U	467133	5368087	12.1	GO	0.712	1	
BCP-	362	30-JUL-16 12:0	10	U	467132	5368081	14.3	GO	0.928	1	
BCP-	363	30-JUL-16 12:0	10	U	467130	5368079	16.9	GO	0.936	1	
BCP-	364	30-JUL-16 12:0	10	U	467136	5368080	15	GO	0.232	7	
BCP-	365	30-JUL-16 12:0	10	U	467137	5368078	14.5	GO	0.258	1	
BCP-	367	30-JUL-16 12:1	10	U	467133	5368068	10.2	GO	0.56	1	
BCP-	368	30-JUL-16 12:1	10	U	467133	5368068	10.2	GO	0.461	1	
BCP-	369	30-JUL-16 12:1	10	U	467132	5368067	11.7	GO	0.365	1	
BCP-	370	30-JUL-16 12:1	10	U	467130	5368066	12.6	GO	0.362	1	
BCP-	371	30-JUL-16 12:1	10	U	467127	5368063	10.7	GO	0.555	1	
BCP-	372	30-JUL-16 12:1	10	U	467127	5368063	10.7	GO	0.609	1	
BCP-	373	30-JUL-16 12:1	10	U	467127	5368063	10.7	GO	0.996	1	
BCP-	374	30-JUL-16 12:1	10	U	467127	5368063	10.7	GO	0.952	1	
BCP-	377	30-JUL-16 12:2	10	U	467130	5368055	10.7	GO	0.16	2	
BCP-	397	31-JUL-16 9:27	10	U	467133	5368105	36.7	GO	0.349	1	
BCP-	398	31-JUL-16 9:29	10	U	467133	5368104	36.4	GO	0.258	1	E. Ivy starting up E-side of trunk
BCP-	401	31-JUL-16 9:35	10	U	467137	5368100	31.8	GO	0.434	1	
BCP-	402	31-JUL-16 9:37	10	U	467129	5368089	32.6	GO	0.217	7	
BCP-	403	31-JUL-16 9:40	10	U	467128	5368100	32.8	GO	0.34	1	
BCP-	404	31-JUL-16 9:42	10	U	467129	5368100	32.6	GO	0.455	7	
BCP-	405	31-JUL-16 9:43	10	U	467127	5368098	31.6	GO	0.372	1	
BCP-	406	31-JUL-16 9:46	10	U	467128	5368096	31.6	GO	0.616	1	
BCP-	407	31-JUL-16 9:48	10	U	467122	5368097	28.7	GO	0.66	1	
BCP-	409	31-JUL-16 9:51	10	U	467122	5368100	28.5	GO	0.252	1	
BCP-	410	31-JUL-16 9:52	10	U	467123	5368095	27	GO	0.608	1	
BCP-	411	31-JUL-16 9:52	10	U	467132	5368094	25.4	GO	0.489	1	
BCP-	414	31-JUL-16 9:54	10	U	467122	5368093	29	GO	0.198	1	
BCP-	415	31-JUL-16 9:57	10	U	467122	5368089	27.8	GO	0.795	1	
BCP-	416	31-JUL-16 9:57	10	U	467122	5368089	27.5	GO	0.23	7	
BCP-	417	31-JUL-16 9:58	10	U	467121	5368086	29.2	GO	0.789	1	
BCP-	418	31-JUL-16 10:0	10	U	467122	5368088	28.7	GO	0.506	1	
BCP-	420	31-JUL-16 10:0	10	U	467122	5368087	29.2	GO	0.713	1	
BCP-	421	31-JUL-16 10:0	10	U	467120	5368083	30.2	GO	1.204	1	
BCP-	422	31-JUL-16 10:0	10	U	467115	5368087	29.9	GO	0.555	1	
BCP-	423	31-JUL-16 10:1	10	U	467117	5368075	30.4	GO	0.696	1	

BCP-	424	31-JUL-16 10:1(	10	U	467118	5368075	30.4	GO	1.886	1
BCP-	425	31-JUL-16 10:1:	10	U	467114	5368069	31.6	GO	0.143	1
BCP-	426	31-JUL-16 10:1:	10	U	467114	5368068	32.8	GO	0.282	1
BCP-	427	31-JUL-16 10:2:	10	U	467119	5368069	29.7	GO	1.85	1
BCP-	428	31-JUL-16 10:2:	10	U	467119	5368069	29.7	GO	1.05	1
BCP-	429	31-JUL-16 10:2!	10	U	467118	5368068	30.2	GO	0.182	1
BCP-	430	31-JUL-16 10:2:	10	U	467112	5368062	28.2	GO	0.291	1
BCP-	431	31-JUL-16 10:2:	10	U	467112	5368062	28.5	GO	0.463	1
BCP-	432	31-JUL-16 10:2:	10	U	467112	5368061	28.7	GO	0.28	1
BCP-	433	31-JUL-16 10:2:	10	U	467113	5368061	29	GO	0.401	1
BCP-	434	31-JUL-16 10:2(	10	U	467113	5368062	29.7	GO	0.765	1
BCP-	435	31-JUL-16 10:3(	10	U	467115	5368064	30.6	GO	1.405	1
BCP-	436	31-JUL-16 10:3(	10	U	467115	5368063	30.6	GO	1.35	1
BCP-	437	31-JUL-16 10:3:	10	U	467124	5368057	33.1	GO	0.156	4
BCP-	444	31-JUL-16 10:4(	10	U	467118	5368047	22.5	GO	2.239	1
BCP-	459	31-JUL-16 11:2(	10	U	467130	5368134	23.4	GO	0.39	1
BCP-	460	31-JUL-16 11:2(	10	U	467130	5368134	23.7	GO	0.614	1
BCP-	462	31-JUL-16 11:3:	10	U	467129	5368126	22.7	GO	0.75	1
BCP-	463	31-JUL-16 11:3:	10	U	467129	5368125	22.5	GO	0.534	1
BCP-	468	31-JUL-16 11:4:	10	U	467132	5368118	24.4	GO	0.46	1
BCP-	473	31-JUL-16 11:5(	10	U	467128	5368107	24.4	GO	0.149	1
BCP-	476	31-JUL-16 11:5:	10	U	467128	5368106	24.6	GO	0.442	7
BCP-	477	31-JUL-16 11:5'	10	U	467119	5368095	24.2	GO	0.365	1
BCP-	479	31-JUL-16 11:5!	10	U	467116	5368088	24.6	GO	0.478	1
BCP-	480	31-JUL-16 12:0:	10	U	467111	5368074	11.7	GO	0.425	1
BCP-	481	31-JUL-16 12:0:	10	U	467110	5368073	17.2	GO	0.575	1
BCP-	483	31-JUL-16 12:0'	10	U	467106	5368066	20.6	GO	1.176	1
BCP-	484	31-JUL-16 12:0'	10	U	467107	5368066	19.8	GO	1.172	1
BCP-	486	31-JUL-16 12:1'	10	U	467151	5368140	28.2	GO	0.642	1
BCP-	487	31-JUL-16 12:1(	10	U	467135	5368140	34	GO	0.625	1
BCP-	488	31-JUL-16 12:1!	10	U	467135	5368140	33.3	GO	0.664	1
BCP-	489	31-JUL-16 12:2(	10	U	467139	5368150	35.9	GO	0.161	1
BCP-	493	31-JUL-16 12:2(	10	U	467132	5368148	29.7	GO	0.972	1
BCP-	495	31-JUL-16 12:2'	10	U	467129	5368146	31.6	GO	0.627	1
BCP-	497	31-JUL-16 12:2!	10	U	467127	5368147	32.6	GO	0.745	1
BCP-	498	31-JUL-16 12:3(	10	U	467122	5368148	38.1	GO	0.97	1

BCP-	501	31-JUL-16 12:3	10	U	467126	5368142	26.6	GO	0.491	1
BCP-	503	31-JUL-16 12:3	10	U	467114	5368135	29.7	GO	0.79	1
BCP-	504	31-JUL-16 12:3	10	U	467109	5368147	34	GO	0.093	1
BCP-	505	31-JUL-16 12:3	10	U	467111	5368145	31.6	GO	0.577	1
BCP-	506	31-JUL-16 12:3	10	U	467109	5368146	32.1	GO	0.647	1
BCP-	508	01-AUG-16 9:3	10	U	467127	5368144	35.9	GO	0.782	7
BCP-	510	01-AUG-16 9:4	10	U	467124	5368133	38.3	GO	0.405	2
BCP-	512	01-AUG-16 9:4	10	U	467119	5368133	37.4	GO	1.186	1
BCP-	513	01-AUG-16 9:4	10	U	467119	5368133	37.4	GO	0.564	1
BCP-	518	01-AUG-16 9:5	10	U	467123	5368116	35.7	GO	0.582	1
BCP-	519	01-AUG-16 9:5	10	U	467128	5368118	34.5	GO	0.603	1
BCP-	520	01-AUG-16 10:(	10	U	467126	5368116	34	GO	0.832	1
BCP-	521	01-AUG-16 10:(	10	U	467124	5368110	32.8	GO	0.291	1
BCP-	522	01-AUG-16 10:(	10	U	467124	5368105	34.5	GO	0.589	1
BCP-	523	01-AUG-16 10:(	10	U	467124	5368113	30.9	GO	0.489	1
BCP-	524	01-AUG-16 10:(	10	U	467115	5368119	33.8	GO	0.598	1
BCP-	525	01-AUG-16 10:(	10	U	467109	5368112	34.5	GO	0.36	1
BCP-	526	01-AUG-16 10:1	10	U	467111	5368111	34.5	GO	0.219	1
BCP-	527	01-AUG-16 10:1	10	U	467113	5368108	34.3	GO	0.412	1
BCP-	528	01-AUG-16 10:1	10	U	467114	5368107	34.5	GO	0.448	1
BCP-	529	01-AUG-16 10:1	10	U	467114	5368105	34.7	GO	0.473	1
BCP-	530	01-AUG-16 10:1	10	U	467113	5368104	34.7	GO	0.446	1
BCP-	531	01-AUG-16 10:1	10	U	467111	5368104	34.5	GO	0.313	1
BCP-	532	01-AUG-16 10:1	10	U	467111	5368102	35.2	GO	0.348	1
BCP-	533	01-AUG-16 10:1	10	U	467111	5368096	36.2	GO	0.147	1
BCP-	534	01-AUG-16 10:1	10	U	467110	5368098	36.2	GO	0.149	1
BCP-	535	01-AUG-16 10:1	10	U	467104	5368101	35.9	GO	0.332	1
BCP-	536	01-AUG-16 10:1	10	U	467105	5368099	36.2	GO	0.018	2
BCP-	537	01-AUG-16 10:1	10	U	467106	5368097	36.9	GO	0.111	1
BCP-	538	01-AUG-16 10:1	10	U	467110	5368096	35.9	GO	0.034	1
BCP-	541	01-AUG-16 10:2	10	U	467112	5368083	34.7	GO	0.455	1
BCP-	542	01-AUG-16 10:2	10	U	467108	5368085	36.2	GO	0.045	1
BCP-	543	01-AUG-16 10:2	10	U	467107	5368085	36.2	GO	0.368	1
BCP-	544	01-AUG-16 10:2	10	U	467106	5368085	36.4	GO	0.134	1
BCP-	545	01-AUG-16 10:2	10	U	467098	5368087	37.6	GO	0.235	1
BCP-	546	01-AUG-16 10:2	10	U	467098	5368076	35	GO	0.617	1

BCP-	548	01-AUG-16 10:3	10	U	467104	5368075	31.4	GO	0.526	1
BCP-	549	01-AUG-16 10:3	10	U	467104	5368073	31.8	GO	0.327	7
BCP-	550	01-AUG-16 10:3	10	U	467106	5368071	32.6	GO	0.642	1
BCP-	551	01-AUG-16 10:3	10	U	467105	5368069	29.4	GO	0.931	1
BCP-	552	01-AUG-16 10:3	10	U	467105	5368069	29.4	GO	0.34	7
BCP-	553	01-AUG-16 10:3	10	U	467106	5368067	29.2	GO	0.98	1
BCP-	554	01-AUG-16 10:3	10	U	467105	5368068	29.4	GO	0.692	1
BCP-	555	01-AUG-16 10:4	10	U	467099	5368063	28.7	GO	0.39	1
BCP-	557	01-AUG-16 10:4	10	U	467096	5368061	25.8	GO	0.184	1
BCP-	558	01-AUG-16 10:4	10	U	467100	5368057	25.6	GO	0.129	2
BCP-	560	01-AUG-16 10:4	10	U	467100	5368057	23	GO	3.854	1
BCP-	561	01-AUG-16 10:4	10	U	467101	5368061	23.7	GO	1.568	1
BCP-	566	01-AUG-16 11:0	10	U	467108	5368140	27.8	GO	0.296	1
BCP-	567	01-AUG-16 11:0	10	U	467108	5368140	27.8	GO	0.09	1
BCP-	568	01-AUG-16 11:0	10	U	467108	5368124	30.4	GO	0.326	1
BCP-	569	01-AUG-16 11:0	10	U	467106	5368121	29.9	GO	0.315	1
BCP-	570	01-AUG-16 11:0	10	U	467106	5368121	29.9	GO	0.283	1
BCP-	571	01-AUG-16 11:1	10	U	467106	5368120	29.9	GO	0.474	1
BCP-	572	01-AUG-16 11:1	10	U	467106	5368120	29.9	GO	0.786	1
BCP-	575	01-AUG-16 11:1	10	U	467097	5368116	23.4	GO	1.825	1
BCP-	578	01-AUG-16 11:2	10	U	467101	5368115	23.7	GO	0.487	1
BCP-	579	01-AUG-16 11:2	10	U	467101	5368114	23.7	GO	0.398	1
BCP-	580	01-AUG-16 11:2	10	U	467100	5368113	23.9	GO	0.605	1
BCP-	581	01-AUG-16 11:2	10	U	467100	5368111	23.7	GO	0.973	1
BCP-	582	01-AUG-16 11:2	10	U	467099	5368110	23.4	GO	0.35	1
BCP-	584	01-AUG-16 11:3	10	U	467106	5368109	13.6	GO	0.462	1
BCP-	585	01-AUG-16 11:3	10	U	467098	5368105	19.6	GO	0.112	1
BCP-	586	01-AUG-16 11:3	10	U	467104	5368099	26.1	GO	0.115	1
BCP-	587	01-AUG-16 11:3	10	U	467102	5368099	25.8	GO	0.693	1
BCP-	589	01-AUG-16 11:3	10	U	467104	5368099	22	GO	0.44	1
BCP-	590	01-AUG-16 11:4	10	U	467105	5368099	23	GO	0.16	1
BCP-	591	01-AUG-16 11:4	10	U	467105	5368098	23.4	GO	0.196	2
BCP-	592	01-AUG-16 11:4	10	U	467105	5368098	23.2	GO	0.218	1
BCP-	593	01-AUG-16 11:4	10	U	467105	5368098	23.2	GO	0.28	1
BCP-	594	01-AUG-16 11:4	10	U	467105	5368098	23.2	GO	0.67	1
BCP-	595	01-AUG-16 11:4	10	U	467105	5368098	23.2	GO	0.457	1

BCP-	596	01-AUG-16 11:4	10	U	467105	5368097	23.7	GO	0.3	1
BCP-	597	01-AUG-16 11:4	10	U	467106	5368093	23.9	GO	0.244	1
BCP-	598	01-AUG-16 11:4	10	U	467106	5368093	23.9	GO	0.244	9
BCP-	599	01-AUG-16 11:4	10	U	467100	5368090	23.2	GO	1.41	1
BCP-	600	01-AUG-16 11:4	10	U	467098	5368086	22.7	GO	0.235	1
BCP-	601	01-AUG-16 11:5	10	U	467097	5368073	18.2	GO	0.746	1
BCP-	602	01-AUG-16 11:5	10	U	467097	5368073	18.2	GO	0.818	1
BCP-	603	01-AUG-16 11:5	10	U	467097	5368073	18.2	GO	0.35	1
BCP-	604	01-AUG-16 11:5	10	U	467097	5368073	18.2	GO	1.055	4
BCP-	605	01-AUG-16 11:5	10	U	467097	5368073	18.2	GO	0.788	1
BCP-	606	01-AUG-16 11:5	10	U	467097	5368073	18.2	GO	0.106	7
BCP-	607	01-AUG-16 11:5	10	U	467097	5368072	18.2	GO	0.92	1
BCP-	608	01-AUG-16 11:5	10	U	467096	5368072	17.9	GO	0.32	7
BCP-	609	01-AUG-16 11:5	10	U	467096	5368071	17.7	GO	0.55	1
BCP-	610	01-AUG-16 11:5	10	U	467091	5368067	20.3	GO	0.24	7
BCP-	612	01-AUG-16 11:5	10	U	467091	5368070	20.8	GO	1.267	1
BCP-	613	01-AUG-16 11:5	10	U	467091	5368070	20.8	GO	1.14	1
BCP-	614	01-AUG-16 11:5	10	U	467091	5368070	20.8	GO	1.24	1
BCP-	615	01-AUG-16 12:0	10	U	467090	5368057	19.6	GO	0.664	1
BCP-	616	01-AUG-16 12:0	10	U	467091	5368057	19.6	GO	0.75	1
BCP-	619	01-AUG-16 12:1	10	U	467095	5368105	25.6	GO	0.538	1
BCP-	620	01-AUG-16 12:1	10	U	467095	5368105	25.6	GO	0.472	1
BCP-	622	01-AUG-16 12:2	10	U	467096	5368102	23.4	GO	0.984	1
BCP-	623	01-AUG-16 12:2	10	U	467096	5368101	23.7	GO	0.366	1
BCP-	624	01-AUG-16 12:2	10	U	467096	5368102	23.9	GO	0.08	1
BCP-	625	01-AUG-16 12:2	10	U	467094	5368100	25.6	GO	0.235	1
BCP-	630	01-AUG-16 12:3	10	U	467093	5368088	27.5	GO	0.3	1
BCP-	637	01-AUG-16 12:4	10	U	467086	5368082	29.7	GO	0.73	1
BCP-	638	01-AUG-16 12:4	10	U	467086	5368082	29.7	GO	1.34	1
BCP-	639	01-AUG-16 12:5	10	U	467086	5368076	28.2	GO	1.204	1
BCP-	640	01-AUG-16 12:5	10	U	467086	5368076	28.2	GO	0.54	7
BCP-	641	01-AUG-16 12:5	10	U	467086	5368076	28.2	GO	1.13	1
BCP-	644	01-AUG-16 12:5	10	U	467076	5368080	33.1	GO	1.114	1
BCP-	645	01-AUG-16 12:5	10	U	467076	5368080	33.1	GO	0.97	1
BCP-	646	01-AUG-16 12:5	10	U	467076	5368080	33.1	GO	0.56	1
BCP-	647	01-AUG-16 12:5	10	U	467076	5368080	32.6	GO	0.246	1

BCP-	648	01-AUG-16 12:5	10	U	467080	5368077	30.2	GO	1.163	1	
BCP-	650	01-AUG-16 1:0(	10	U	467080	5368076	30.6	GO	0.29	1	
BCP-	651	01-AUG-16 1:03	10	U	467089	5368070	28	GO	1.29	1	
BCP-	652	01-AUG-16 1:03	10	U	467088	5368071	28	GO	0.202	1	
BCP-	653	01-AUG-16 1:03	10	U	467089	5368068	28	GO	0.465	7	
BCP-	654	01-AUG-16 1:03	10	U	467089	5368067	28	GO	0.412	7	
BCP-	655	01-AUG-16 1:05	10	U	467091	5368064	30.4	GO	0.81	1	
BCP-	656	01-AUG-16 1:05	10	U	467091	5368064	30.4	GO	0.39	1	
BCP-	657	01-AUG-16 1:05	10	U	467091	5368064	30.4	GO	0.312	1	
BCP-	658	01-AUG-16 1:05	10	U	467090	5368064	30.2	GO	0.507	1	
BCP-	659	01-AUG-16 1:05	10	U	467089	5368064	29	GO	0.513	1	
BCP-	660	01-AUG-16 1:06	10	U	467085	5368067	28.2	GO	0.48	1	
BCP-	661	01-AUG-16 1:08	10	U	467085	5368070	26.3	GO	0.26	1	
BCP-	662	01-AUG-16 1:08	10	U	467085	5368070	26.8	GO	0.18	1	
BCP-	664	01-AUG-16 1:11	10	U	467076	5368072	29.9	GO	0.48	1	
BCP-	665	01-AUG-16 1:12	10	U	467075	5368072	29.9	GO	0.454	1	
BCP-	673	02-AUG-16 8:56	10	U	467070	5368101	24.9	GO	1.09	1	
BCP-	678	02-AUG-16 9:01	10	U	467071	5368103	25.4	GO	1.12	1	
BCP-	680	02-AUG-16 9:04	10	U	467068	5368095	26.1	GO	0.29	1	
BCP-	683	02-AUG-16 9:06	10	U	467070	5368092	25.8	GO	0.736	1	E. Ivy at base poised to climb
BCP-	684	02-AUG-16 9:07	10	U	467071	5368088	27	GO	1.504	1	
BCP-	687	02-AUG-16 9:10	10	U	467068	5368083	27	GO	0.395	1	
BCP-	688	02-AUG-16 9:10	10	U	467068	5368082	27	GO	0.27	1	
BCP-	690	02-AUG-16 9:13	10	U	467067	5368085	26.8	GO	0.72	1	
BCP-	693	02-AUG-16 9:16	10	U	467064	5368078	28	GO	1.25	1	
BCP-	695	02-AUG-16 9:19	10	U	467065	5368071	24.2	GO	0.6	1	
BCP-	696	02-AUG-16 9:19	10	U	467065	5368071	24.2	GO	0.475	1	
BCP-	697	02-AUG-16 9:19	10	U	467065	5368071	24.2	GO	0.63	1	
BCP-	699	02-AUG-16 9:20	10	U	467066	5368071	23.9	GO	0.521	1	
BCP-	700	02-AUG-16 9:21	10	U	467066	5368071	23.9	GO	1.203	1	
BCP-	701	02-AUG-16 9:21	10	U	467066	5368071	23.9	GO	0.442	1	
BCP-	702	02-AUG-16 9:22	10	U	467061	5368063	24.6	GO	0.29	2	
BCP-	703	02-AUG-16 9:23	10	U	467061	5368063	25.1	GO	0.32	1	
BCP-	704	02-AUG-16 9:23	10	U	467061	5368062	25.8	GO	0.57	1	
BCP-	705	02-AUG-16 9:24	10	U	467060	5368059	26.8	GO	1.189	1	

BCP-	706	02-AUG-16 9:2	10	U	467060	5368059	26.8	GO	1.33	1
BCP-	707	02-AUG-16 9:2	10	U	467060	5368059	27	GO	0.43	1
BCP-	708	02-AUG-16 9:2	10	U	467060	5368059	27	GO	0.39	3
BCP-	709	02-AUG-16 9:2	10	U	467059	5368057	28	GO	1.199	1
BCP-	710	02-AUG-16 9:2	10	U	467063	5368057	29.4	GO	0.576	3
BCP-	711	02-AUG-16 9:2	10	U	467063	5368056	29.9	GO	0.152	1
BCP-	721	02-AUG-16 9:3	10	U	467058	5368065	27.8	GO	0.403	7
BCP-	722	02-AUG-16 9:3	10	U	467057	5368064	27.5	GO	0.844	1
BCP-	723	02-AUG-16 9:3	10	U	467056	5368061	29.2	GO	0.459	3
BCP-	724	02-AUG-16 9:4	10	U	467056	5368060	29.7	GO	0.783	1
BCP-	725	02-AUG-16 9:4	10	U	467054	5368062	29	GO	0.902	1
BCP-	726	02-AUG-16 9:4	10	U	467054	5368062	29	GO	0.98	1
BCP-	727	02-AUG-16 9:4	10	U	467054	5368062	29	GO	0.685	1
BCP-	728	02-AUG-16 9:4	10	U	467053	5368063	29.2	GO	0.368	1
BCP-	731	02-AUG-16 9:4	10	U	467055	5368074	29.4	GO	0.92	1
BCP-	732	02-AUG-16 9:4	10	U	467059	5368073	27.5	GO	0.809	1
BCP-	733	02-AUG-16 9:4	10	U	467060	5368077	25.6	GO	1.121	1
BCP-	358	30-JUL-16 12:0	10	U	467132	5368089	10.9	GO	0.775	1
BCP-	392	31-JUL-16 9:20	10	U	467142	5368118	29	HOLLY	0.11	1
BCP-	461	31-JUL-16 11:2	10	U	467130	5368134	23.9	HOLLY	0.32	1
BCP-	201	28-JUL-16 11:3	10	U	467177	5368092	31.1	Pacific Cr	0.247	1
BCP-	199	28-JUL-16 11:0	10	U	467199	5368053	25.6	Pear	0.719	1
BCP-	250	28-JUL-16 12:4	10	U	467167	5368062	10.7	Pear	0.1	1
BCP-	252	28-JUL-16 12:4	10	U	467159	5368056	21.3	Pear	0.61	1
BCP-	253	28-JUL-16 12:5	10	U	467166	5368046	22.7	Pear	0.415	1
BCP-	262	28-JUL-16 1:00	10	U	467177	5368057	20.6	Pear	0.835	1
BCP-	280	30-JUL-16 9:44	10	U	467137	5368088	34.7	Pear	0.384	1
BCP-	314	30-JUL-16 10:3	10	U	467136	5368042	26.6	Pear	0.616	1
BCP-	315	30-JUL-16 10:3	10	U	467136	5368042	26.6	Pear	0.728	1
BCP-	316	30-JUL-16 10:4	10	U	467138	5368040	28	Pear	0.36	1
BCP-	317	30-JUL-16 10:4	10	U	467138	5368040	28	Pear	0.15	1
BCP-	318	30-JUL-16 10:4	10	U	467138	5368040	28	Pear	0.171	1
BCP-	359	30-JUL-16 12:0	10	U	467133	5368088	11.2	Pear	0.598	1
BCP-	419	31-JUL-16 10:0	10	U	467122	5368087	29.2	Pear	0.545	1
BCP-	440	31-JUL-16 10:3	10	U	467123	5368048	27.5	Pear	0.016	1
BCP-	441	31-JUL-16 10:4	10	U	467122	5368048	27.5	Pear	0.01	1

BCP-	466	31-JUL-16 11:3	10	U	467131	5368124	23.4	Pear	0.646	1
BCP-	496	31-JUL-16 12:2	10	U	467132	5368147	31.8	Pear	0.865	1
BCP-	509	01-AUG-16 9:4(	10	U	467126	5368143	35.9	Pear	0.891	1
BCP-	573	01-AUG-16 11:1	10	U	467096	5368117	26.8	Pear	0.766	1
BCP-	443	31-JUL-16 10:4	10	U	467118	5368047	22.2	Plum	0.771	1
BCP-	448	31-JUL-16 10:5	10	U	467112	5368043	21.5	Plum	0.36	2
BCP-	449	31-JUL-16 10:5(	10	U	467108	5368041	21.8	Plum	0.036	1
BCP-	478	31-JUL-16 11:5	10	U	467117	5368089	24.6	Plum	0.042	1
BCP-	540	01-AUG-16 10:2	10	U	467116	5368092	34.3	Plum	0.042	1
BCP-	556	01-AUG-16 10:4	10	U	467098	5368060	26.6	Plum	0.01	1
BCP-	559	01-AUG-16 10:4	10	U	467100	5368057	25.6	Plum	0.237	1
BCP-	626	01-AUG-16 12:2	10	U	467091	5368098	29.7	Plum	0.09	1
BCP-	627	01-AUG-16 12:2	10	U	467092	5368096	28.2	Plum	0.165	1
BCP-	628	01-AUG-16 12:3	10	U	467093	5368095	24.6	Plum	0.084	2
BCP-	663	01-AUG-16 1:1(	10	U	467076	5368072	29.7	Plum	0.1	1
BCP-	712	02-AUG-16 9:2	10	U	467064	5368058	28.7	Plum	0.183	3
BCP-	713	02-AUG-16 9:3(	10	U	467063	5368059	29.2	Plum	0.22	2
BCP-	714	02-AUG-16 9:3(	10	U	467063	5368059	29.2	Plum	0.292	3
BCP-	715	02-AUG-16 9:3	10	U	467064	5368059	29.4	Plum	0.302	1
BCP-	716	02-AUG-16 9:3	10	U	467064	5368059	29.7	Plum	0.36	2
BCP-	717	02-AUG-16 9:3	10	U	467064	5368059	29.7	Plum	0.15	2
BCP-	718	02-AUG-16 9:3	10	U	467064	5368058	29.9	Plum	0.22	2
BCP-	719	02-AUG-16 9:3	10	U	467065	5368058	30.2	Plum	0.43	2
BCP-	720	02-AUG-16 9:3	10	U	467074	5368047	29	Plum	0.28	1
BCP-	729	02-AUG-16 9:4	10	U	467054	5368063	28	Plum	1.16	1

N

N

SCALE
0 20
meters

2003

Imagery Date: 6/7/2015 10 U 467153.61 m E 5368096.53 m N elev 27 m eye alt 221 m

Distribution of All Trees at Burnside Corner Park

*please refer to report for legend

Compiled by M. Sawatzky in 2016

Ecosystem Units of Burnside Corner Park, View Royal, BC

M. Sawatzky

Burnside Corner Park is located on Southern Vancouver Island, centered around 467141 mE and 5368090 mN in UTM zone 10U. Elevation as the site rises from around 24 m asl in the south-west to 42 m asl in the north-east corridor. Surrounded by development, this park is home to numerous rare and endangered Garry Oak and Douglas-fir plant associations in the Coastal Douglas-Fir moist maritime (CDFmm) Biogeoclimatic zone. All site series were labaled in accodance to the provincial standard code for terrestrial ecosystem mapping for the CDFmm. Satellite imagery courtesy of Google Earth, acquired on June 7, 2015. Map created with Adobe Photoshop.

Boundaries

- Study Area
- Lot 'C'

ECOSYSTEM UNITS

Garry Oak Dominant Sites

OMvw1b	GARRY OAK OUTCROPS: Grey rock-moss - Wallace's selaginella on warm aspects and Broom-moss - Broad-leaved stonecrop plant associaton on cool aspects.
QB6tM	BROME/MIXED GRASSES: Grasses surrounding Garry Oak outcrops, two storied stand with Garry Oak in the understory and Douglas-fir in the overstory. Orchardgrass dominates.
OR6iM	NOOTKA ROSE: Dense multi-layered shrub thickets of Nootka rose - Snowberry and occasional Oceanspray. Few trees, irregular canopy. Lower-slope preference.
GO6iM	MIXED GARRY OAK - DOUGLAS FIR FOREST: Irregular stand of Garry Oak, Douglas-fir, Grand Fir and exotic fruit species. Spurge-laurel dominates shrub layer (> 70%), notable - Indian Plum, Saskatoon, Snowberry, and Tall Oregon Grape.
GOgy6iM	BLACK HAWTHORN: Dense stand of Black Hawthorn in gully that parallels outcrop and drains into the 'Seasonal Wet Depression'. Seasonally wet site. Irregular stand of Garry Oak, Douglas-fir (overstory) and exotic fruit trees on dryer margins.
GO6sB	SNOWBERRY - OCEANSPRAY: Dense shrub thickets with Snowberry and a taller shrub component of Oceanspray. Sporadic Garry Oak trees. Moisture receiving lower/toe-slope sites.

Douglas-fir Dominant Sites

DOf6iM	ALASKA ONIONGRASS - ORCHARDGRASS: Grassy, dry mid-slope sites with Alaska Oniongrass in dryer areas but Orchardgrass is colonizing rapidly (> 10%). Sporadic trees and shrubs. Occasional hairy honeysuckle on blocky talus areas.
DGx6iC	GRAND FIR - OREGON GRAPE: Mature Douglas-Fir canopy with young to mature Grand Fir trees dominating the regeneration layer. Shrub layer includes dull Oregon-grape, Snowberry, Bald-hip rose, and Saskatoon. Clusters of Broad-leaved Starflower.
DS6sC	SALAL - BRACKEN FERN: Gently sloping, convex area in the shade of the large outcrop in the NE corridor. Dense shrub layer with Salal, Bracken fern in wetter sections and snowberry in drier. Sporadic conifers form canopy.
DGgyf6iM	MIXED DOUGLAS FIR - GARRY OAK FOREST: Mixed irregular stand of Douglas-fir, Garry Oak and exotic fruit tree species. Occupies gullies in upper slope positions and broadens out in the mid-slope/toe. Spurge-laurel occupies > 80% of shrub layer.
CD6iM	RED-OSIER DOGWOOD - BLACK HAWTHORN: Dense red-osier dogwood with black hawthorn and occasional Garry Oak - Douglas Fir. Parallel to drainage ditch, likely a seasonal floodplain.

Disturbed Sites

TR1a	GRAVEL TRAIL NETWORK: Short trail network in the northern section of the park. Gravels are angular and fine (5-10 mm). Invasive herbs growing along margins.
ES2a	PARTLY CLEARED AND COMPACTED SOILS: Likely due to construction efforts next door. Exposed soil. Numerous invasive species make up vegetation layers.
ES1a	SEASONAL WET DEPRESSION: Bare elongated patch of exposed, hard-compacted soil in gully parallel to outcrop. Less than 4% vegetated with invasive species (Spurge-laurel and Herb Robert).

N

SCALE
0 20
meters

Invasive Species at Burnside Corner Park JULY 2016

M. Sawatzky

Spurge-laurel is the dominant invasive species at Burnside Corner Park. It exists over almost the entirety of the map area to varying degrees. Invasive shrubs here are Himalayan Blackberry, English Ivy, English Holly, English Hawthorn, Scotch Broom, and Bittersweet Nightshade. Invasive grasses (Orchardgrass, Sweet Vernal Grass, Barren Brome to name a few) are found all over the park and thus not included on the map. There are numerous invasive forbs, and only two more major ones were included on the map, Wall Lettuce and Dead Nettle / Purple Dead Nettle. Herb Robert is distributed all over the area in small percentages and thus was not included on the map. Other invasive herbs present are Canada Thistle, Rose Champion, Mint, Queen Anne's Lace, and Hary & Smooth varieties of Cat's Ear.

Boundaries

- Study Area
- Lot 'C'
- Gravel Trail

INVASIVE SPECIES LEGEND

Spurge-laurel concentration (% of shrub layer)

- Absent-Trace: None to rare individual plants
- 1-15%: Individuals and odd clusters of individuals
- 16-30%: Individuals, small patches
- 31-50%: Clusters of Individuals, small to medium sized patches
- 51-71%: Medium to large branching patches
- > 72%: Large networks of branching patches

Invasive Shrub Species

- HIMALAYAN BLACKBERRY: Individuals to thick branching multi-layer thickets. Occasional cutleaf Everygreen Blackberry.
- ENGLISH IVY: Small clusters to branching vines along ground and over dead fall. Occasionally climbing trees and contributing to death of Douglas-fir, Garry Oak and Grand Fir.
- ENGLISH HOLLY: Seedlings to young trees scattered through the park, typically close to the trail network and a few near the south-west edge.
- ENGLISH HAWTHORN: Saplings to small trees. Doing very well, many red berries.
- SCOTCH BROOM: Occasional small to large (> 2m tall) shrubs, typically found proximal to edges (trails, roads).
- BITTERSWEET NIGHTSHADE, aka POISONBERRY: Long branching vines with numerous bright red to dark purplish poisonous berries.

Invasive Forb Species (Major)

- WALL LETTUCE: Single plants to small patches.
- DEAD NETTLE / PURPLE DEAD NETTLE: Long branching networks on the forest floor.

N

SCALE
0 20
meters

Invasive Species at Burnside Corner Park AUGUST 2016

M. Sawatzky

On July 24, 2016 the rigorous removal of Spurge-laurel from the isolated northern zones began with a work party hosted by the author, Jenny Hebb and the View Royal Parks Department. The work party was a success, removing approximately half of the Spurge from the aforementioned locations, which were chosen based on isolation from the larger zone by a gravel trail system. Six other days were spent pulling and cutting daphne by the author to realize the goal of full eradication of Spurge-laurel from the north-east. Due to time limitations and placement of the remaining patches (within dense Nootka Rose thickets, and very close to apartment windows) there are still a few plants and small patches that persist in the northern zones. Continued efforts are necessary and complete removal is recommended.

Boundaries

- Study Area
- Lot 'C'
- Gravel Trail

INVASIVE SPECIES LEGEND

Spurge-laurel concentration (% of shrub layer)

- Absent-Trace: None to rare individual plants
- 1-15%: Individuals and odd clusters of individuals
- 16-30%: Individuals, small patches
- 31-50%: Clusters of Individuals, small to medium sized patches
- 51-71%: Medium to large branching patches
- > 72%: Large networks of branching patches

Invasive Shrub Species

- HIMALAYAN BLACKBERRY: Individuals to thick branching multi-layer thickets. Occasional cutleaf Everygreen Blackberry.
- ENGLISH IVY: Small clusters to branching vines along ground and over dead fall, occasionally climbing trees and contributing to death of Douglas-fir, Garry Oak and Grand Fir.
- ENGLISH HOLLY: Seedlings to young trees scattered through the park, typically close to the trail network and a few near the south-west edge.
- ENGLISH HAWTHORN: Saplings to small trees. Doing very well, many red berries.
- SCOTCH BROOM: Occasional small to large (> 2m tall) shrubs, typically found proximal to edges (trails, roads).
- BITTERSWEET NIGHTSHADE, aka POISONBERRY: Long branching vines with numerous bright red to dark purplish poisonous berries.

Invasive Forb Species (Major)

- WALL LETTUCE: Single plants to small patches.
- DEAD NETTLE / PURPLE DEAD NETTLE: Long branching networks on the forest floor.

N

SCALE
0 20
meters

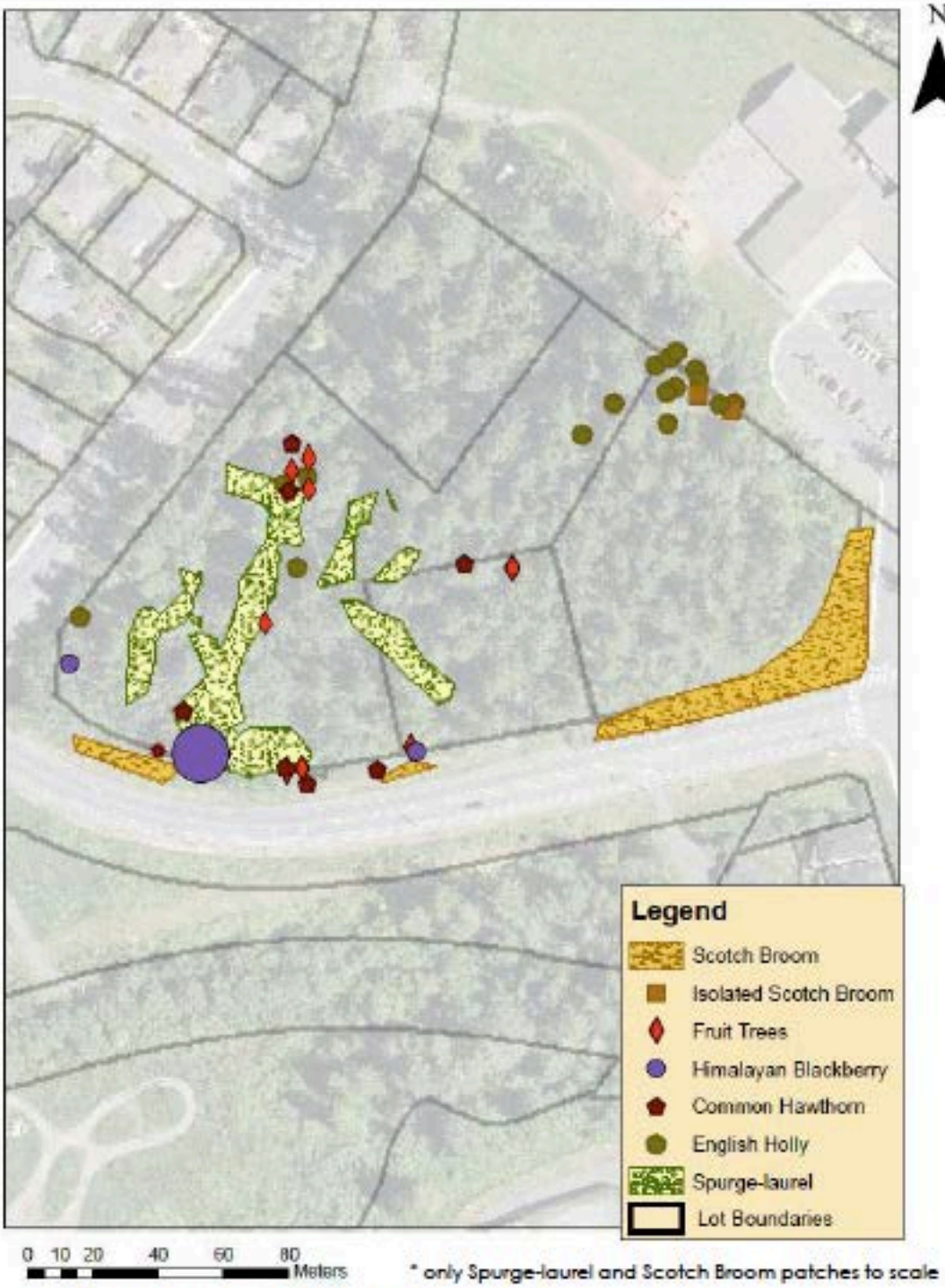
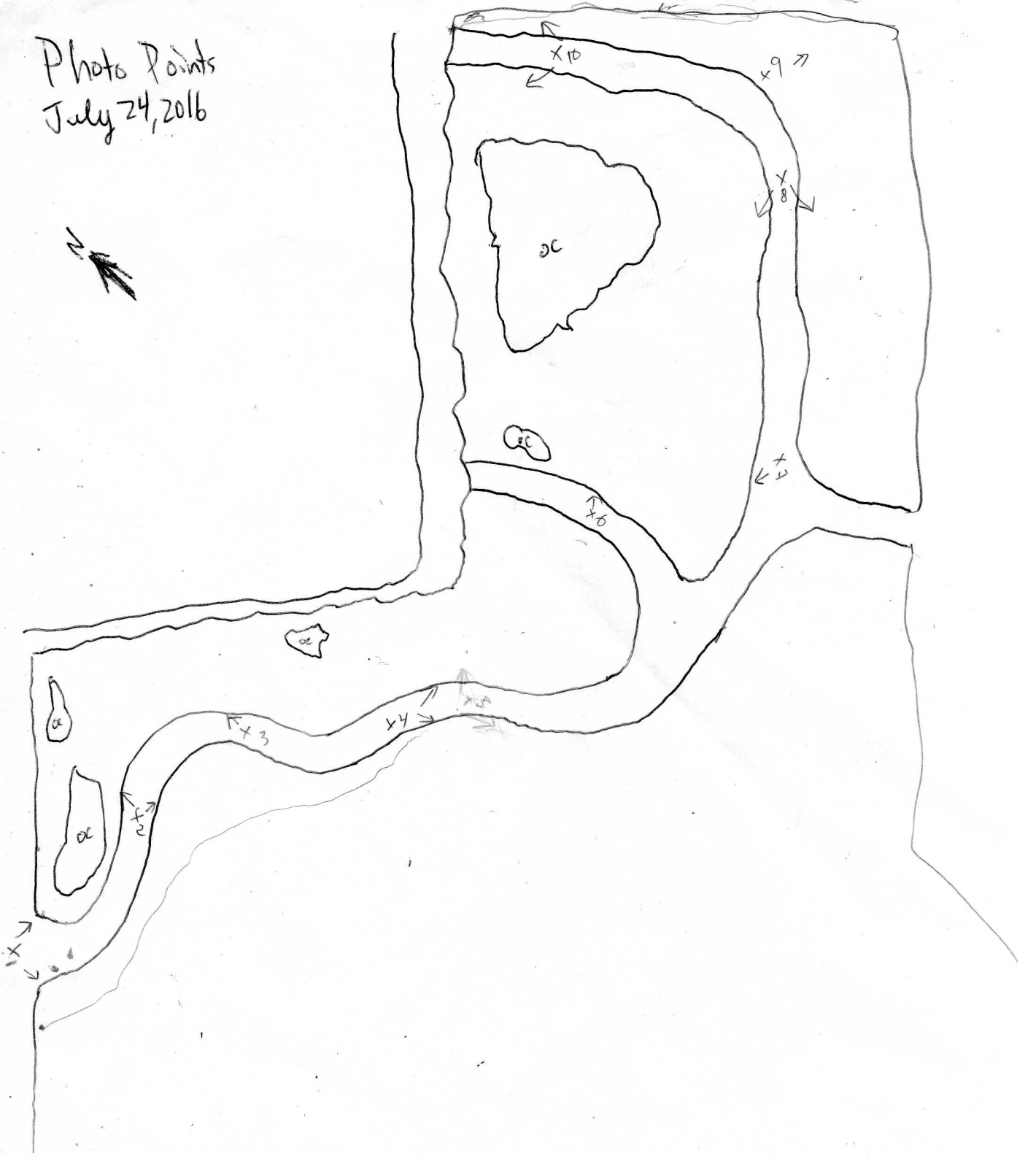


Figure 5. Burnside Corner Park invasive non-native plant occurrences

Photo Points
July 24, 2016



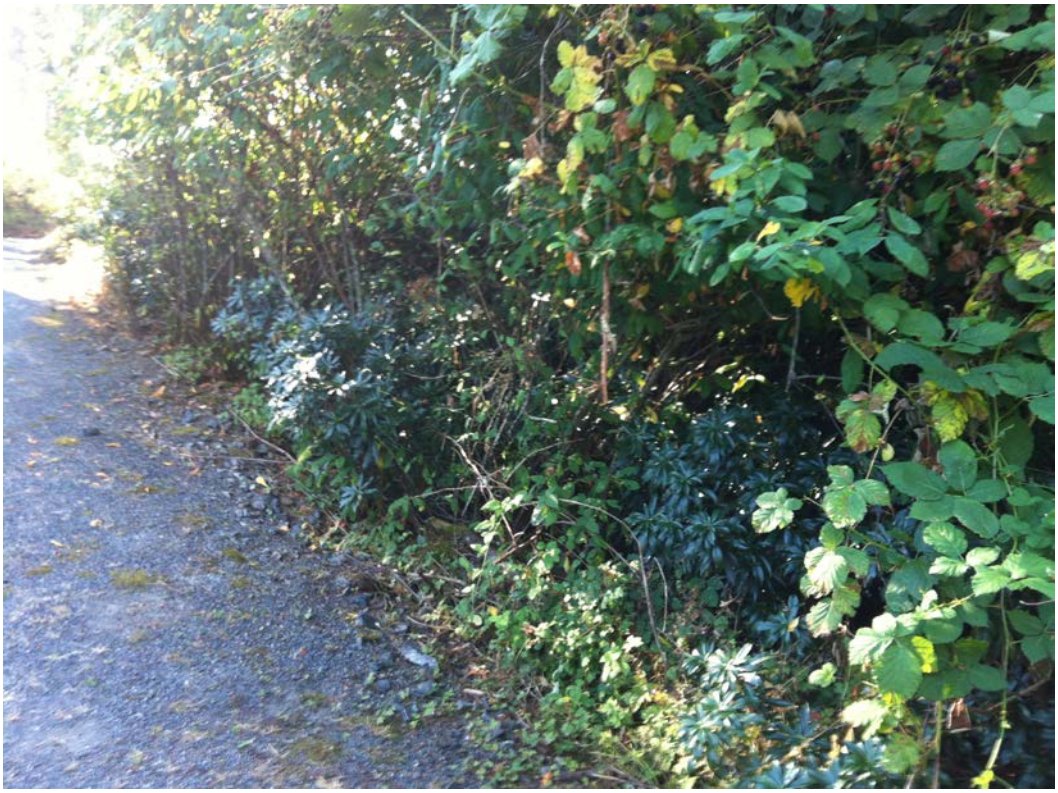
APPENDIX J. Representative photographs from photo point locations.

The first four photographs are of the sites that did not have a before/after picture.

P-1 looking south

P-2 looking east

APPENDIX J. Representative photographs from photo point locations.



P-4 looking south-east

P-5 looking south

APPENDIX J. Representative photographs from photo point locations.

The following photo-points/directions all had before/after photos and there is one set per page.

P-1 looking east

(before)

(after)

APPENDIX J. Representative photographs from photo point locations.

P-2 looking north

(before)

(after)

APPENDIX J. Representative photographs from photo point locations.

P-3 looking north

(before)

(after)

APPENDIX J. Representative photographs from photo point locations.

P-4 looking east

(before)

(after)

APPENDIX J. Representative photographs from photo point locations.

P-5 looking north-east

(before)

(after)

APPENDIX J. Representative photographs from photo point locations.

P-6 looking east

(before)

(after)

APPENDIX J. Representative photographs from photo point locations.

P-7 looking west

(before)

(after)

APPENDIX J. Representative photographs from photo point locations.

P-8 looking south

(before)

(after)

APPENDIX J. Representative photographs from photo point locations.

P-8 looking west

(before)

(after)

APPENDIX J. Representative photographs from photo point locations.

P-9 looking east

(before)

(after)

APPENDIX J. Representative photographs from photo point locations.

P-10 looking west

(before)

(after)

APPENDIX J. Representative photographs from photo point locations.

P-10 looking north

(before)

(after)