

memory refers to the ecological information contained in everything from species biodiversity and genomes to landforms; ecological memory determines the degree of resistance a landscape has to disturbance as well as the ability of that landscape to recover from a disturbance. When ecological memory is lost, the ability of the system to recover is compromised and the outcome of regeneration may be significantly different from the original biological community. This is the case for the portion of South Woods directly adjacent to parking lot one.

4.2.9 Summary

A summary of ecosystem distribution and related statistics is presented below (Table 8).

Table 8. Summary of Ecosystem Distribution

Ecosystem Type	Count	Minimum Area (m ²)	Maximum Area (m ²)	Sum (m ²)
Younger Second Growth Forest	7	174	13774	20237
Older Second Growth Forest	8	3391	73920	176153
Woodland	15	50	7601	35067
Strongly Fluctuating Water Table	4	2437	14325	34077

5.0 Discussion and Recommendations

The eastern coastal lowland of Vancouver Island has exceptionally high biodiversity values and comprises a unique ecological region in Canada. Intense development pressure has resulted in the loss of many rare ecosystems in the Greater Victoria area. This report was initiated in response to the urgent need for inventory information on the natural areas of the University of Victoria campus, to support sound land use planning and promote good land stewardship. This report provides scientific data on ecosystem distribution, vegetation, quality and condition as an aid to land management decisions. Following is a brief general assessment of each area considered during phase one and two of the Natural Features Study, as well as recommendations for management and restoration. More detailed information can be found in the attribute tables associated with the maps.

5.1 *Mystic Vale*

Mystic Vale is not a healthy functional riparian area. Restoration work is needed if the University is going to fulfill its commitment to “ensure the long-term health of the area as habitat for local flora and fauna” (University of Victoria 2003b). *The findings of this study*

concur with the recommendations put forth by the previous studies presented in the literature review with one exception. The amount of blowdown in Mystic Vale during wind storms in 2007 created gaps in the canopy so it is not necessary to remove selected trees to increase sunlight penetration to the forest floor.

Another issue not raised in other reports is the impact of the high volume of dog traffic throughout Mystic Vale. This is a concern because dogs frequently go off trails and trample the already stressed native vegetation, contribute to stream bank instability and erosion, and reduce water quality by increasing the particulate matter suspended in the water. These impacts are substantial in the Vale due to the sheer quantity of dogs being walked through it every day. The University Cedar Hill Corner property, which is adjacent to the Vale, is utilized as one of the few off-leash dog parks in the greater Victoria area and a considerable number of people extend their activity into Mystic Vale. Throughout this study the vast majority of the dogs observed were not on leash even though there are signs posted asking owners to do so at both ends of Mystic Vale. Furthermore, most if not all of the signs have been vandalized with regard to the request to keep dogs on leash (Figure 20). *The University needs to take additional measures to reduce the impacts of dogs and mountain bikes impacts in the natural areas on campus.*



Figure 20. Vandalized Sign in Mystic Vale

Another problem with the signage is the wording used regarding prohibited activities within Mystic Vale. The statement 'refrain from mountain biking' leaves room for interpretation; 'do not mountain bike' or 'mountain biking prohibited' sends a much clearer message to users of the area. It is also unclear which trails in Mystic Vale are designated trails and which are rogue trails as there is no signage in the Vale itself and some of the non-designated trails are quite substantial.

And finally, to whom should yard waste or litter dumping be reported? Community policing can be an efficient way to preserve protected areas, however, with regard to the dumping of yard waste within Mystic Vale this has proven ineffective. There are multiple cases where

households have moved there compost piles from their yards into the Vale. In some of these instances you can see horticultural species radiating out from the piles and invading the Vale. This problem needs to be addressed. *The University needs to take measures to reduce yard waste impacts.*

Conversely, yard waste is not the only source of invasive horticultural species within Mystic Vale. A *Lamium* species was observed invading from private property, and cyclamen, periwinkle, and St John's Wort were observed invading from landscaping around university property, specifically University Houses three and four. These point source satellite populations must be removed as soon as possible. Furthermore, a significant portion of Mystic Vale is overrun with non-point source English ivy, holly, and daphne. This translates into reduced native herbaceous species cover and diversity, and reduced wildlife habitat. Methods for dealing with these invasive species will be discussed in section 5.7. *The University needs to alert residents whose properties are adjacent to the campus to the negative impacts of non-native invasive species from their properties.*



Figure 21. Erosion of Stream Bank Adjacent to Trail

Inappropriate trail placement in conjunction with off-leash dogs and mountain biking has resulted in the removal of stream bank vegetation (Figure 21). The consequences of riparian area vegetation removal include decreased drag which impacts water velocity and scouring, decreased bank stability leading to erosion, undercutting and slumping, and increased water turbidity. The trail network in Mystic Vale is also contributing to soil compaction of the root zone along trails and may be leading to deteriorating tree health. *The University needs to re-design trails that are currently in riparian areas.*

The cumulative effects of poorly placed trails, stream downcutting, bank erosion, invasive species etc. are having a significant negative impact on the health and function of Mystic Vale. Managing access through active control methods such as fences, railings, trail relocation, rogue trail decommissioning, and elevated boardwalks would go a long way towards improving the health of Mystic Vale. Examples of successful active control methods in relation to trails can be seen in Pacific Rim National Park, Cathedral Grove Provincial Park and municipal (e.g. Saanich) and regional (e.g. Capital Regional District) parks . For example, fences like railings, and in some areas boardwalks, are used to restrict movement within the parks to the designated trails. Passive methods such as more signs stating restrictions regarding dogs on leashes and careful site selection for trail relocation should also be employed. As this area is used extensively by many members of the surrounding community, it may also be necessary to initiate a community outreach program regarding planned restoration activities and the consequences of inappropriate behavior. Significant work is necessary to restore Mystic vale. *Given its historical cultural significance, current use of the area, and the universities commitment to protect and restore Mystic Vale, it is recommended that the university make restoring this area a priority.*

5.2 South Woods

There are some areas on campus that may not be classified according to the sensitive ecosystem classification scheme due to the high level of disturbance they have experienced in the recent past. Although parts of South Woods are relatively intact, the majority of this area is highly variable and the vegetation composition does not ‘fit’ discreetly into any of the sensitive ecosystem inventory classes. For example, there are several locations where Garry oaks, which are a drought tolerant species, are found meters away from black cottonwoods, which are water loving trees. There are several potential reasons this could occur. For example, the underlying substrate may consist of glacial outwash which is typically well drained which would favor the oaks, and the ground water table may be close enough to the surface to support Black cottonwoods (Dr. Brenda Beckwith pers. com.). Another potential explanation is that when the area was originally logged ‘undesirable’ tree species were left behind and colonizing species filled the newly created gaps resulting in an unusual tree species composition (Dr. Brenda Beckwith pers. com.). In short, the reason for this unusual assemblage may be any combination of above ground process such as light availability and space, below ground processes such as hydrology, and past land use practices.

It could be argued that the wetter areas, which are characterized by black cottonwoods and red-oisier dogwood, most closely resemble a wetland or a zone with a strongly fluctuating water table. However, no overland flow was evident during the study and thus these areas can not be considered true wetlands. An alternative explanation is that it has a strongly fluctuating water table similar to Cunningham Woods. However, given the uncertainty surrounding how to classify these areas it is proposed to call these areas thickets due to there impenetrability or dense growth of shrubs and trees. The drier areas, on the other hand, can be considered older second growth forest. This is due to the dominance of conifers in the tree layer in conjunction

with a well developed middle story of bigleaf maple which is characteristic of distant past disturbance events, as well as snag and coarse woody debris content.

Windstorms over the past couple of years have resulted in a large amount of blowdown within the central portion of South Woods (Figure 12). Blowdown is a natural disturbance that will lead to ecological succession. However, blowdown of this magnitude results in the accumulation of large amounts of woody debris which in turn increases the risk of forest fires which is a concern in urban settings. *A professional risk assessment of forest fires associated with the blowdown in South Woods needs to be undertaken.*

Finally, invasive species are a considerable problem in this area. From the perspective of the author invasive species pose the most significant threat to the ecological integrity of South Woods. English ivy is the most prolific invasive species, and holly, Daphne, and Himalayan blackberry are also abundant. Methods for dealing with these invasive species will be discussed in section 5.7.

5.3 Haro Woods and Finnerty Ravine

Although the university owned portion of Haro Woods is relatively small, if the entire area continues to be a natural ecosystem, it has the potential to provide important wildlife habitat as well as recreational opportunities. Haro Woods is used extensively by hikers, dog walkers, and mountain bikers. In the lower section of the property owned by the University, several bike jumps have been built. There is also some evidence of mountain biking in Finnerty Ravine. This in conjunction with rogue trail creation has resulted in soil compaction and the loss of some understory vegetation. A decision should be made as to whether or not bike jumping is a desirable activity in these areas, and where trails should be. If the goal is to restore the ecological integrity of this area, it may be necessary to decommission secondary trails, install signage to deter individuals from using these trails and thus altering the landscape, and in the case of Finnerty Ravine, construct a bridge or stairs to discourage the public from using this area ad hoc as a way of getting from one side of the ravine to the other (ES 482/ER 411, 2007). However, if the goal is to encourage human use of these areas, other measures such as viewing platforms in Finnerty Ravine should be considered.

Like most of the other natural areas on campus, Haro Woods and Finnerty Ravine are over run with invasive exotic plants. The most dominant exotics are English ivy and English holly in Haro Woods, and Himalayan blackberry in Finnerty Ravine. *It is recommended that the university follow the example of the Cordova/ Cadboro Bay Residents' Association in invasive species removal and ecological restoration. The illegal dumping of yard waste needs to be discouraged by signage and notices to nearby homes to remove this source of invasive plants.*

Another substantial problem in Haro Woods is the use of this property by many adjacent residences as a dumping ground for yard waste and or compost. During field work piles of

plant debris were found in the woods just off the main trail running through the university's property, including species such as Rose Campion, a well known garden ornamental escapee.

5.4 University Cedar Hill Corner Property

As previously discussed, the University Cedar Hill Corner property is a high use area and contains few native plant species relative to its size. The site houses a small apple orchard, a large soil pile, some Douglas-fir and Garry oaks, a small enclosed parcel used exclusively by the Center for Forest Biology, and a field used extensively by dog walkers and Frisbee golfers. This property has the lowest wildlife habitat value out of any of the natural areas on campus.

As with Mystic Vale and Haro Woods, many of the adjacent residences have moved their household composts, and in some cases vegetable gardens, onto the University Cedar Hill Corner property. However, given the lack of native plant communities on the University Cedar Hill Corner property, this is not as big a concern on this property as it is the others. That said, non-indigenous plants can be seen moving from these waste piles into the surrounding landscape.

From an ecological standpoint, the biggest potential problem at this site is the invasive exotic seed bank currently housed in the soil pile. The soil pile is not meant to be a permanent fixture; rather it is a storage site. The soil has been created by the university by combining soil excavated from construction sites, sandy material from the stadium area when it was replaced with artificial material, and compost (Jim Hansson pers. com.). The soil from this pile is used in landscaping around the campus. The problem is that the soil pile is overrun with exotic species many of which are highly invasive. *By moving the soil around the campus, landscaping personnel are essentially acting as a vector for these species. It is recommended that the soil be covered by tarps to prevent further seed germination and seed bank expansion.*

The university's built environment is expanding and barring large land acquisition the amount of land the University owns is finite. Eventually the university will run out of parking lots to build on, and decisions will be made regarding which natural areas need to be preserved, and which may be converted for other types of land use. With this in mind, it has been determined that development would have the least impact on this property than any other under consideration in this report. That said, this area is used as a well loved off leash dog park and any changes that impact this activity will likely encounter opposition from the surrounding community. This is a situation that would benefit from the development of a collaborative planning process as outlined in section five, action two, of the campus plan (University of Victoria 2003).

5.5 Garry Oak Meadow and Camas Meadow Area

The Garry oak meadow and camas meadow area contains several vegetation types. The area adjacent to the parking lot is dominated by red-osier dogwood and Douglas-fir. This area

appears to be wetter than the surrounding Garry oak community which is understandable considering the likely inputs of storm water from the parking lot 6 and the West Campus Gate Road. The conversion from a community dominated by Garry oaks to one dominated by Douglas-fir is typical of a community in successional transition from a meadow to a forest. *The area adjacent to Gordon Head Road and Cedar Hill Cross Road should be mowed regularly to maintain the structure and function of the Garry oak meadow.*

5.6 Additional Inventory Data

There is a need for additional inventory data to avoid building over species at risk on campus. Ideally, this inventory should take place through all seasons of a year to identify rare species not previously observed due to seasonality.

5.7 Invasive Species Removal

The most significant threat to the natural areas observed in this study is the invasion of exotic species. Exotic species are dispersed throughout all of the natural areas studied. The five most common invasive species are: English holly, English hawthorn, daphne, common periwinkle, Himalayan blackberry, and English ivy. Of these species the ivy, holly and blackberry are the most pervasive. Action seven of the campus plan states that the University will “Implement and monitor restoration projects to steward natural areas to better health, replacing invasive flora with native, drought-tolerant plants” (University of Victoria 2003). Furthermore the university will “involve community volunteers on these projects” (University of Victoria 2003). Given the scope of the exotic invasive species problem, time and man power are predicted to be constraining factors of a comprehensive removal and re-planting program. *Several students have expressed interest in creating a student body to work on removing the non-indigenous species from campus, and it is strongly suggested that a volunteer group to tackle this problem be formed.*

For large infestations, such as the English ivy on campus, it is recommended that the university consider adopting parts of the Bradley method (Fuller and Barbe 1985) as an approach for manually controlling weeds. This method entails physically removing small areas of the infestation, starting with the best stands of native vegetation i.e. small satellite weed populations, and working towards those areas with the largest weed populations. When single, or small groups of weeds are removed from an area, it is predicted that this area will be promptly re-inhabited and stabilized by the regeneration of native plants. However, if large areas are cleared and not quickly replanted, the restoration efforts are likely to fail because large disturbed tracts of exposed soil will become re-colonized by new weeds. It is also imperative that slopes which have been cleared of weeds are immediately replanted with native vegetation to prevent erosion. Also, when removing non-indigenous species from a site, it is essential that all cut plants that are in berry are wrapped in tarps to avoid distributing these berries to new sites.

If the resources needed to undertake the necessary large scale removal of invasive exotic species throughout the natural areas on campus are not currently available, it is strongly recommended that several actions are undertaken to mitigate their spread in the interim. First, the populations at the advancing edges of populations of periwinkle and St. John's Wort in Mystic Vale should be removed as soon as possible before they become better established. Second, ivy should be cut at the base of all of the trees it is currently climbing in all of the natural areas on campus. The ivy may be left on the trees until it has died at which point pulling it down can be done much more easily. Finally, a monitoring program should be established to check that efforts have been successful.

5.7.1 English Ivy

English ivy exhibits dense growth with abundant leaves which blocks sunlight from low growing native plants, crowds them out, and prevents the germination of their seeds. All of the natural areas examined in this study contain patches of 'ivy desert' where ivy growth is so dominating that it has excluded most other plants on the forest floor. English ivy was also observed on the trunks of many trees. This is an issue because it deprives bark of normal contact with air and micro-organisms (Figure 22). Heavy ivy cover may reduce the tree's foliage and thus its capacity for photosynthesis, and the weight of the vines and leaves together with moisture from rain, makes these trees top-heavy and prone to damage or blowdown during windstorms (GOERT 2003). Significantly, almost all of the blowdown trees in the area surveyed, which are marked as rootballs on the map, are covered with ivy.



Figure 22. Ivy on Tree Trunk

The highest priority for ivy removal should be the ivy on tree trunks to remove the seed source; ivy only produces fruits and seeds after a vertical climb (GOERT 2003). Vines should be cut approximately one meter above ground level to kill the upper portions, after which, the vines can be left to decay on the trees or be removed when brittle (GOERT 2003). Vines on the ground can be hand-pulled, and shovels should be used to remove as much of the root system as possible. It is important to pull seedlings before they become firmly established. In order to minimize soil erosion, large areas on steep slopes should not be cleared all at once,

clearing should not be conducted too soon before heavy winter rains, and the ground should be re-planted, and preferably mulched, immediately after clearing.

5.7.2 Himalayan blackberry

Himalayan blackberry can turn open areas into shrub dominated ecosystems. Himalayan blackberry has a dense canopy which blocks out light, eliminates the ground cover of most native herbaceous species, and prevents the sprouting and establishment of small trees (GOERT 2003). *Himalayan blackberry can be cut and removed with hand tools including shears/loppers, shovels and weed wrenches. This should be done before the blackberry seeds set and is easiest when the ground is still moist. The root should be removed as much as possible to minimize resprouting.* If the blackberry is pulled before seeds are produced, the debris may be piled and left as brush cover for birds and small mammals. However, care must be taken to prevent the rooting of cut material, and areas where blackberry has been removed should be checked in subsequent years for any sprouting roots which may have been missed. Large established patches can be controlled by cutting new growth from late July to early October. This will prevent the tips from rooting and expanding the patch. The time of year control measures are initiated is important. If the blackberry is cut too early in the year new tips will grow (GOERT 2003).

5.7.3 English Holly

English Holly is a hardy shrub that can withstand a variety of growing conditions. It prefers shade but can tolerate sun, and can grow in most soils. English Holly can be found in deciduous, mixed, and coniferous forests. It may come to dominate the shrub layer and out compete native plants for sun, nutrients, and water (Evergreen 2007). It reproduces through seeds which are dispersed by birds, by suckering which is when new shoots arise from an existing root system, and by layering which is when the plant grows roots where stems touch the ground (Evergreen 2007). *English Holly can be controlled by hand pulling small seedlings by the roots and cutting off more mature trees at the ground level providing the seeds are also removed from the site (Evergreen 2007). Regardless of whether the plants are cut or pulled, the site will require frequent monitoring to check for re-growth.*

5.7.4 Daphne

Daphne or Spurge-laurel, is an evergreen shrub native to western and southern Europe. It is able to tolerate a range of conditions from dry to moist soil and full to partial shade (Evergreen 2007). It has the potential to grow as a monoculture in forest understories displacing native species and potentially changing the soil chemistry (Evergreen 2007). It reproduces through berries and its primary vector is birds, this means that controlling the dispersal of this plant is difficult. When dealing with this plant, it is essential that gloves are always worn. The plant produces a noxious substance which causes severe eye and skin irritation for some people. It is also important to never transport cuttings or plants in an enclosed vehicle because the toxic compounds produced by the plant can also cause respiratory irritation. *When possible, hand-pulling followed by native species planting should be employed. Small plants should be pulled from moist soil; Larger plants should be cut beneath the soil, below the point where there is a visible colour change from brown stem to*

orange root, preferably in the summer (Evergreen 2007). *Daphne* stems cut above the soil resprout, and repeated visits to the site to insure control measures have been effective will be necessary.

5.7.5 Common Periwinkle

Common Periwinkle is a plant native to Europe which has become invasive in the Pacific Northwest. It reproduces by stolons or runners, with stems rooting at the nodes. This invasive plant forms dense ground cover, often in coniferous forests, crowding out other native plants (Tanalta 2007). Common Periwinkle is also one of the few invasive plants easily controlled by hand pulling due to the fact that it does not spread by seed but rather by rooting stolons. In other words, this plant has limited reproduction and spreading mechanisms. *Repeated pulling will essentially 'starve' the plant. That said, it is important to make sure it is removed down to the root level, the site is heavily mulched after it is removed, and the site is re-planted with native species (Tanalta 2007).*

5.7.6 English Hawthorn

English Hawthorn is native to lowland areas of Britain and Europe. English hawthorn is a deciduous tree or shrub that prefers moist to damp disturbed places such as thickets, wetlands, and open forests, it produces berries and can live up to 250 years (GOERT 2003). English hawthorn has also been known to hybridize with the native black hawthorn (*C. douglasii*). English hawthorn's primary vector are birds, however, the plant also appears to spread vegetatively, suckering from its long spreading roots when the main stem is cut (GOERT 2003). *As English hawthorn is particularly invasive in Garry oak ecosystems where it replaces open grassland habitat with a dense shrub and small tree layer, the highest priority for its removal should be in Garry oak ecosystems (GOERT 2003).*

Care must be taken to correctly distinguish English hawthorn from the native black hawthorn to ensure that only the non-native invasive plant is removed. When removing English hawthorn gloves should be worn at all times because hawthorn has long thorns that can lead to festering wounds. Seedling should be hand pulled when the soil is moist, where as young plants and older trees can be cut close to the base (GOERT 2003). Cutting is most effective when approximately 20 percent of the flowers have gone to seed, but should be avoided if the surrounding native plants are flowering and or setting seed (GOERT 2003). Cutting should also be avoided when the plant is full of berries so as to avoid scattering said berries. To prevent regeneration, roots should be removed where possible; alternatively, the cut stump should be frayed or burnt to reduce resprouting (GOERT 2003). Hawthorn has the ability to regenerate from cuttings and thus all cuttings should be removed from the site (GOERT 2003).

6. Conclusions

The Natural Features Inventory is intended to be used as a management tool and to alert land use decision makers to the current state of the natural areas on campus and the existence of important ecological features. Although these ecosystems are mapped individually, most are

interdependent and should not be considered in isolation; they must be evaluated within the context of the overall landscape. Small, fragmented stands do not support a large diversity of wildlife. However, the University of Victoria natural areas function as reservoirs for biodiversity in an otherwise highly urbanized landscape, act as buffers between residential areas and more fragile ecosystems such as riparian areas, and provide wildlife corridors and important habitat niches throughout the campus. In other words, the value of individual ecosystem types lies at least in part on their spatial pattern upon a landscape and how they abut and interact with nearby ecosystems and land use. Where there is a mosaic of ecosystems such as wetlands mixed with woodlands or second growth conifer forests, the value of individual ecosystem components is greatly enhanced as wildlife habitat. For example, many of the bird species that mainly feed in wetlands will perch or nest in adjacent forests. Another example are some amphibians, which spend most of their year in forest habitats but reproduce in wetlands.

All of the natural areas on campus have been modified by human activity to some extent. Nevertheless, if any land use changes such as storm water diversion or development are being contemplated, it is imperative that a site assessment is carried out by a qualified professional to determine if the proposed change will have a detrimental effect on the ecosystem. It is possible to conserve, restore, and enhance ecosystem remnants so that they function well for future generations of humans and wildlife species. Ecosystems and plant species will change over time through the process of succession regardless of human involvement. Yet the remaining ecosystems on campus can be managed to maintain resource values while simultaneously minimizing the loss of ecosystem function.

The University of Victoria has a dual mandate of serving the needs of the student body and providing healthy natural areas for a sustainable community. There are many challenges in managing a campus land base that includes natural areas with different ecological features along with a number of different types of pressures relating to development, growth and human activity. To balance these two goals, the natural Features study presented here and the existing Campus Plan can be used to generate a Natural Areas Management Plan to guide future efforts in maintaining the livability of the campus environment.

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Comment [n3]: ?

Appendix A –UVic Vascular Plant Species (Herbarium 2000)

**Checklist of Vascular Plants of the UVic Campus
University of Victoria Herbarium Contribution No. 3
Compiled by B. Costanzo, G. A. Allen and J. A. Antos
April 1995; updated February 2000.**

II. Overall Species List (* recorded by David Newell in 1983 list and "?" indicates doubtful occurrence or not inventoried since 1993)

Abies grandis
Acer circinatum -planted
*Acer glabrum**?
Acer macrophyllum
Achlys triphylla
Adenocaulon bicolor
Agropyron repens
*Agrostis alba**
*Agrostis exarata**
*Agrostis oregonensis**
*Agrostis tenuis**
Aira praecox (outcrops)
Allium acuminatum
Alnus rubra
Alopecurus geniculatus
*Amaranthus albus**
*Amaranthus retroflexus**
Amelanchier alnifolia
Anagalis arvensis
*Anemone lyalli**?
*Anthemis arvensis**
Anthemis cotula
Anthoxanthum odoratum
Arabidopsis thaliana
Arbutus menziesii
Arenaria macrophyllum
Arrhenatherum elatius
*Aruncus slyvester**?
*Aster eatonii**
*Aster hesperis**?
Aster sp.
Aster subspicatus
Athyrium filix-femina

Avena fatua
Barbarea verna*
Bellis perennis
Betula sp.
Bidens amplissima*
Brassica campestris
Brassica nigra*
Brassica sp.
Brodiaea coronaria
Brodiaea hyacinthina (=Triteleia hyacinthina)
Bromus carinatus*
Bromus pacificus
Bromus sitchensis*
Bromus tectorum*
Calandrinia ciliata
Capsella bursa-pastoris
Camassia quamash
Cardamine angulata
Cardamine oligosperma
Cardamine pulcherrima
Carex hendersonii
Cerastium arvense (outcrops)
Cerastium vulgatum*
Chenopodium album
Chrysanthemum leucanthemum
Cirsium arvense
Cirsium edule
Cirsium sp.
Conium maculatum*
Convolvulus arvensis
Convolvulus sepium
Corallorhiza maculata
Cornus stolonifera
Crataegus douglasii
Crataegus monogyna
Cynosurus cristatus
Cytisus scoparius
Dactylis glomerata
Daphne laureola
Daucus carota
Disporum hookeri*?
Dodecatheon hendersonii
Dodecatheon pulchellum*?
Dryopteris expansa
Echinochloa crusgalli*
Epilobium angustifolium

Epilobium munitum
Epilobium sp.
Epipactis helleborine
Equisetum arvense
Erodium cicutarium
Erythronium oreganum
Erythronium revolutum
Eschscholtzia californica*
Galium triflorum
Gaultheria shallon
Geranium carolinianum
Geranium dissectum*
Geranium molle (outcrops)
Geranium pusillum*?
Geum macrophyllum
Glyceria striata (in stream near bridge) Gnaphalium palustre*
Goodyera oblongifolia
Habenaria dilatatum
Hedera helix
Heracleum lanatum*
Hieracium sp.
Holcus lanatus
Holodiscus discolor
Hordeum leporinum*?
Hypericum formosum*
Hypericum perforatum*?
Hypochaeris radicata
Ilex aquifolium
Juncus balticus*
Juncus bolanderi*?
Juncus bufonius*
Juncus effusus (in drainage ditch) Juncus tenuis
Lactuca communis
Lactuca muralis
Lamium purpureum
Lapsana communis
Lathyrus nevadensis
Leotodon taraxocoides*
Lepidium campestre
Lepidium heterophyllum*
Linaria canadensis*
Lolium perenne
Lomatium nudicaule
Lonicera ciliosa
Lonicera hispidula
Lupinus bicolor

Lupinus arboreus
Luzula campestris
Luzula sp.
Lysichitum americanum (aquatic)
Madia glomerata*?
Mahonia nervosa
Maianthemum dilatatum
Malus sp.
Matricaria maritima
Matricaria matricaria
Matricaria matricarioides
Medicago lupulina*
Medicago sativa*
Melica subulata*
Melilotus alba
Melissa officinalis*
Monotropa uniflora
Montia linearis
Montia perfoliata
Montia sibirica
Myosotis discolor
Myosotis laxa*
Navarretia squarrosa
Nemophila parviflora
Oenleria cerasiformis
Oenanthe sarmentosa
Orobanche uniflora*
Osmorhiza chilensis
Oxalis stricta*
Pachistima myrsinites
Papaver argemone*
Phalaris arundinacea
Phalaris canariensis*
Philadelphus lewisii
Phleum pratense
Physocarpus capitatus
Plagiobothrys scouleri*
Plantago lanceolata
Plantago major
Poa annua*
Poa bulbosa*
Poa compressa*
Poa pratensis
Polygonum aviculare
Polygonum douglasii*
Polygonum lapathifolium

Polygonum persicaria*
Polypodium glycyrrhiza
Polystichum munitum
Populus tremuloides
Populus balsamifera ssp. trichocarpa
Portulaca oleraceae*
Potentilla pacifica/anserina
Prunella vulgaris
Prunus emarginata
Pseudotsuga menziesii
Pteridium aquilinum
Pyrus fusca (=Malus fusca)
Quercus garryana
Ranunculus acris*
Ranunculus ficaria*
Ranunculus occidentalis
Ranunculus uncinatus
Ranunculus repens
Raphanus raphanistrum
Rhamnus purshiana
Rhinanthes minor
Ribes bracteosum*
Ribes lobbii
Ribes sanguineum
Rorippa curvisiliqua
Rosa gymnocarpa
Rosa nutkana
Rosa pisocarpa
Rubus discolor
Rubus parviflorus
Rubus spectabilis
Rubus ursinus
Rumex acetosa
Rumex crispus
Rumex occidentalis*
Rumex obtusifolius (along lawn)
Salix hookeriana
Salix lasiandra
Salix scouleriana
Salix sitchensis
Sambucus racemosa
Sanicula crassicaulis
Satureja douglasii
Senecio vulgaris
Silene gallica*
Sisymbrium officinale

Sisyrinchium angustifolium
Smilacina racemosa
Solanum nigra*
Solanum dulcamara
Spergula arvensis
Spergularia rubra*
Spiraea douglasii
Spiranthes romanzoffiana
Stachys cooleyae
Stellaria calycantha*
Stellaria media
Symphoricarpos albus
Taraxacum officinale
Taxus brevifolia
Tellima grandiflora
Thalspi arvense*
Thuja plicata
Tiarella trifoliata
Tragopogon porrifolius
Trientalis latifolia
Trifolium arvense*
Trifolium dubium
Trifolium pratense
Trifolium repens
Trillium ovatum
Tsuga heterophylla*?
Typha latifolia
Ulex europaeus*
Urtica dioica
Vaccinium parvifolium
Veronica arvensis*
Veronica americana
Veronia peregrina*
Veronica persica*
Veronica serpyllifolia*
Vicia cracca
Vicia hirsuta
Vicia sativa
Vicia villosa
Vulpia myuros*

Appendix B –Bryophyte and Tree Species Data (Godfrey 1975)

Table 1. A list of the species of bryophytes found on each tree species

I. On Abies grandis

Isothecium stoloniferum (Hook.)Brid.
Homalothecium lutescens (Hedw.)Robins.
Dicranum Hedw.species
Homalothecium nuttallii (Wils.)Jaeg.
Plagiothecium elegans (Brid.)Sull.

II. On Quercus garryana

Neckera menziesii Hook.
Isothecium stoloniferum (Hook.)Brid.
Orthotrichum pulchellum Brunt.
Orthotrichum Hedw.species
Homalothecium lutescens (Hedw.)Robins.
Homalothecium nuttallii (Wils.)Jaeg.
Eurhynchium stokesii (Turn.)B.S.G.

III. On Acer macrophyllum

Homalothecium lutescens (Hedw.)Robins.
Isothecium stoloniferum (Hook.)Brid.
Neckera menziesii Hook.
Eurhynchium stokesii (Turn.)B.S.G.
Dicranum Hedw. species
Orthotrichum pulchellum Brunt.
Orthotrichum Hedw. species
Porella platyphylloidea (Schwein.)Lindb.
Porella species
Bazzania species
Scapania species

IV. On Populus trichocarpa

Homalothecium lutescens (Hedw.)Robins.
Eurhynchium stokesii (Turn.)B.S.G.
Eurhynchium oreganum (Sull.)Jaeg.&Sauerb.
Orthotrichum pulchellum Brunt.
Isothecium stoloniferum (Hook.)Brid.
Neckera douglasii Hook.
Brachythecium asperillum (C.Muell.)Sull.
Porella platyphylloidea (Schwein.)Lindb.
Porella species
Scapania species

V. On Pseudotsuga menziesii

Hypnum circinale Hook.
Dicranum Hedw. species

Table 2. Constancy* of Bryophyte species on each tree species

Tree Species	Bryophyte species											
	Stand no	1	2	3	4	5	6	7	8	9	10	11
<u>Abies grandis</u>	1	6	5									
	2	6	5	1								
	4	7	5		1							
<u>Quercus garryana</u>	1	10	3	4	1	1	2	1				
<u>Acer macrophyllum</u>	2	2	3	3			3	3				3
	3	6		4	1	3	3	2	1			1
<u>Populus trichocarpa</u>	3	14	1	2	4	4	1	2	1	1	1	1

*Constancy classes: 1=0-20%, 2=21-40%, 3=41-60%, 4=61-80%, 5=81-100%.

Species abbreviations: Isoth stol=Isothecium stoloniferum, Neck menz=Neckera menziesii, Forella p=Forella platyphylloidea, Homal lut=Homalothecium lutescens, Eurh stok=Eurhynchium stokesii, Ortho pul=Orthotrichum pulchellum, Neck dougl=Neckera douglasii, Homal nutt=Homalothecium nuttallii, Eurh oreg=Eurhynchium oreganum.

Appendix Ca –Coarse Woody Debris Data (Chatterson 1995)

Table 1. Volume of coarse woody debris in each of the two natural areas (m³/ha).

Mystic Vale	Cunningham Woods
85.5	53.1

Table 2. Number of pieces of coarse woody debris in each size class for both areas.

Diameter (cm)	Mystic Vale	Cunningham Woods
5.0-9.9	1	9
10.0-14.9	5	4
15.0-19.9	2	4
20.0-24.9	3	2
25.0-29.9	3	4
>30.0	8	3
Totals	21	27

Table 3. Number of pieces of coarse woody debris by decay class in both natural areas.

Decay class	Mystic Vale	Cunningham Woods
1	2	2
2	7	11
3	7	8
4	6	5
5	4	7
Totals	26	33

Appendix Cb –Snag Data (Chatterson 1995)

Table 4. Snags in the natural areas

Decay Class	Mystic Vale	Cunningham Woods
2	3	2
3	10	16
4	11	15
5	3	7
6	2	3
7	0	1
Totals	29	44

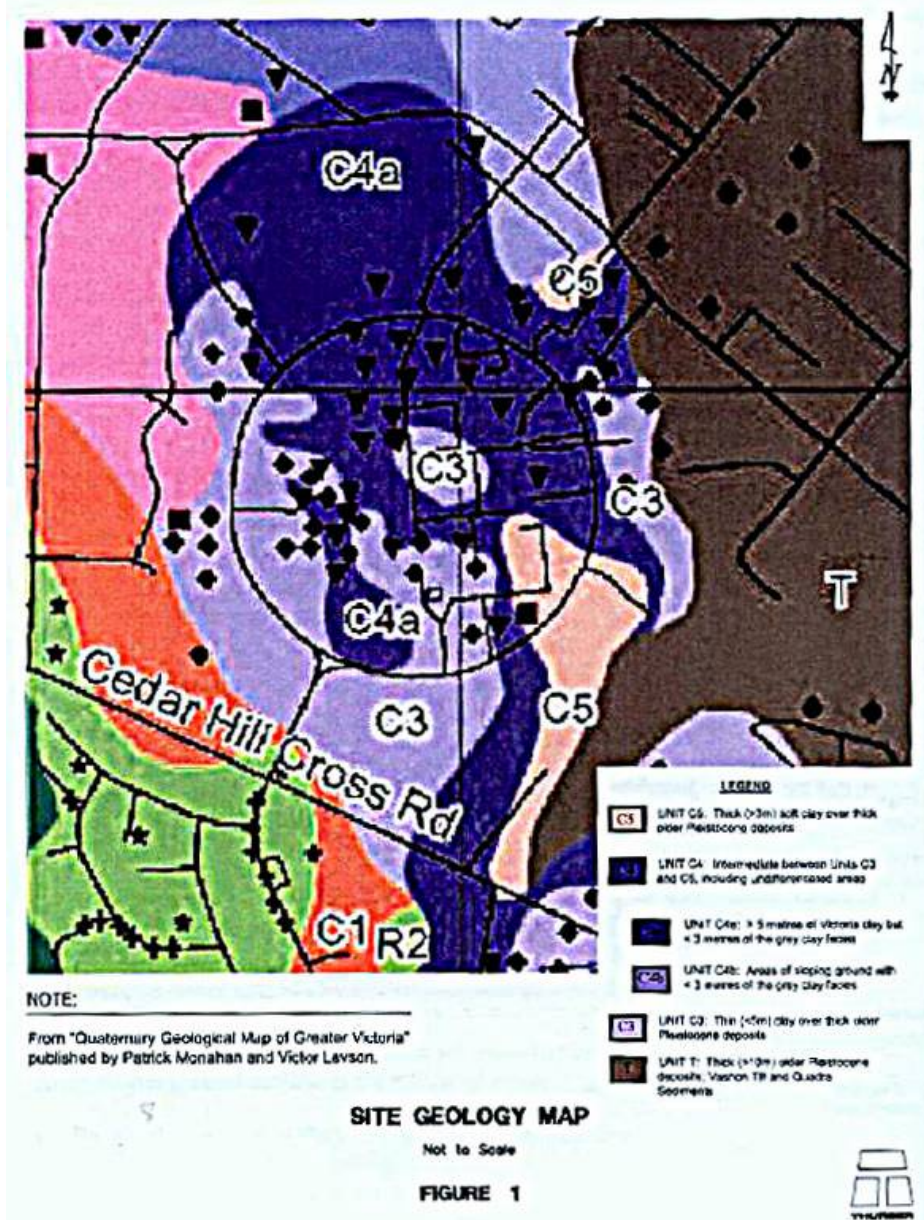
Table 5. Number of snags by diameter class in the natural areas.

Diameter (cm)	Mystic Vale	Cunningham Woods
20.0-29.9	3	4
30.0-39.9	0	11
40-49.9	1	10
50.0-59.9	1	11
60.0-69.9	9	3
>70	14	4
Totals	29	44

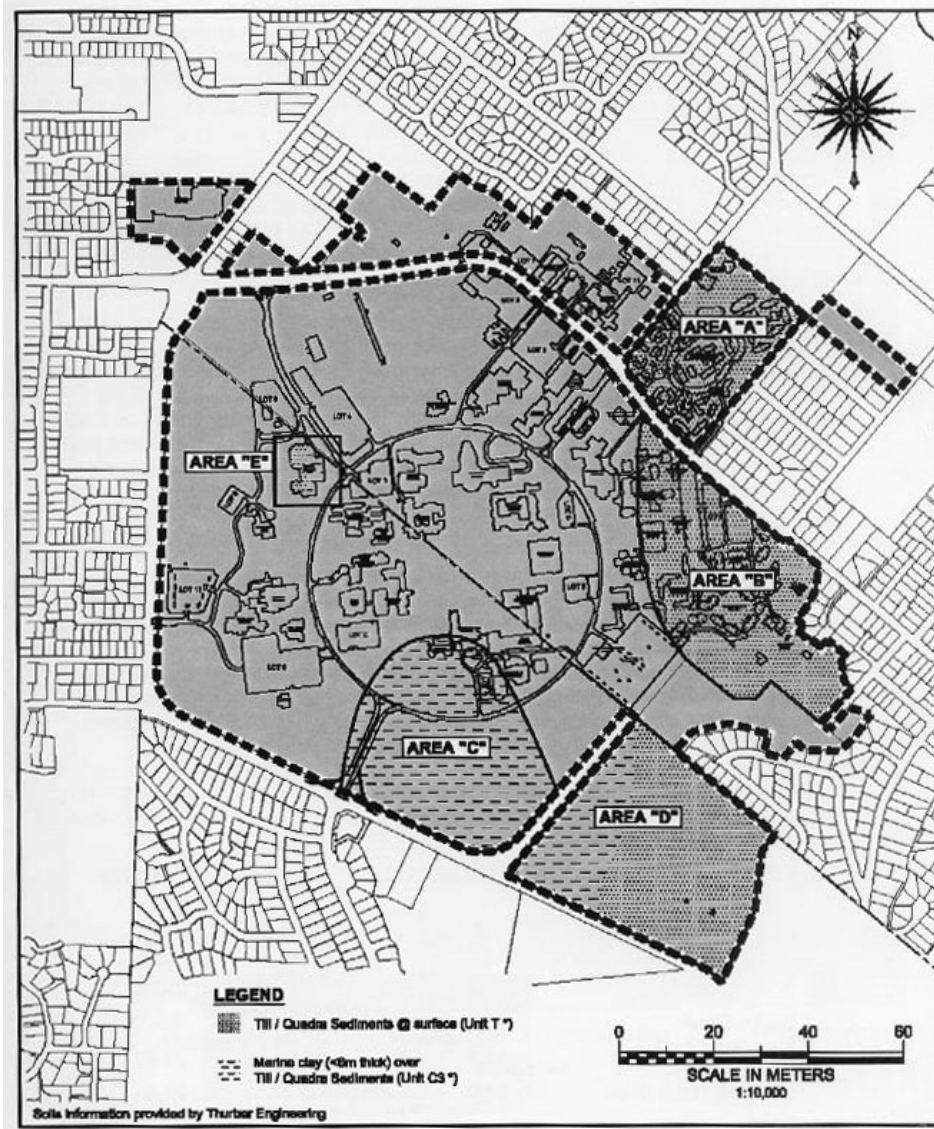
Table 6. Height of snags in natural areas.

Height (m)	Mystic Vale	Cunningham Woods
1.0-4.9	0	10
5.0-9.9	8	13
10.0-14.9	5	4
15.0-19.9	2	7
20.0-24.9	3	7
>25	10	2
Totals	29	44

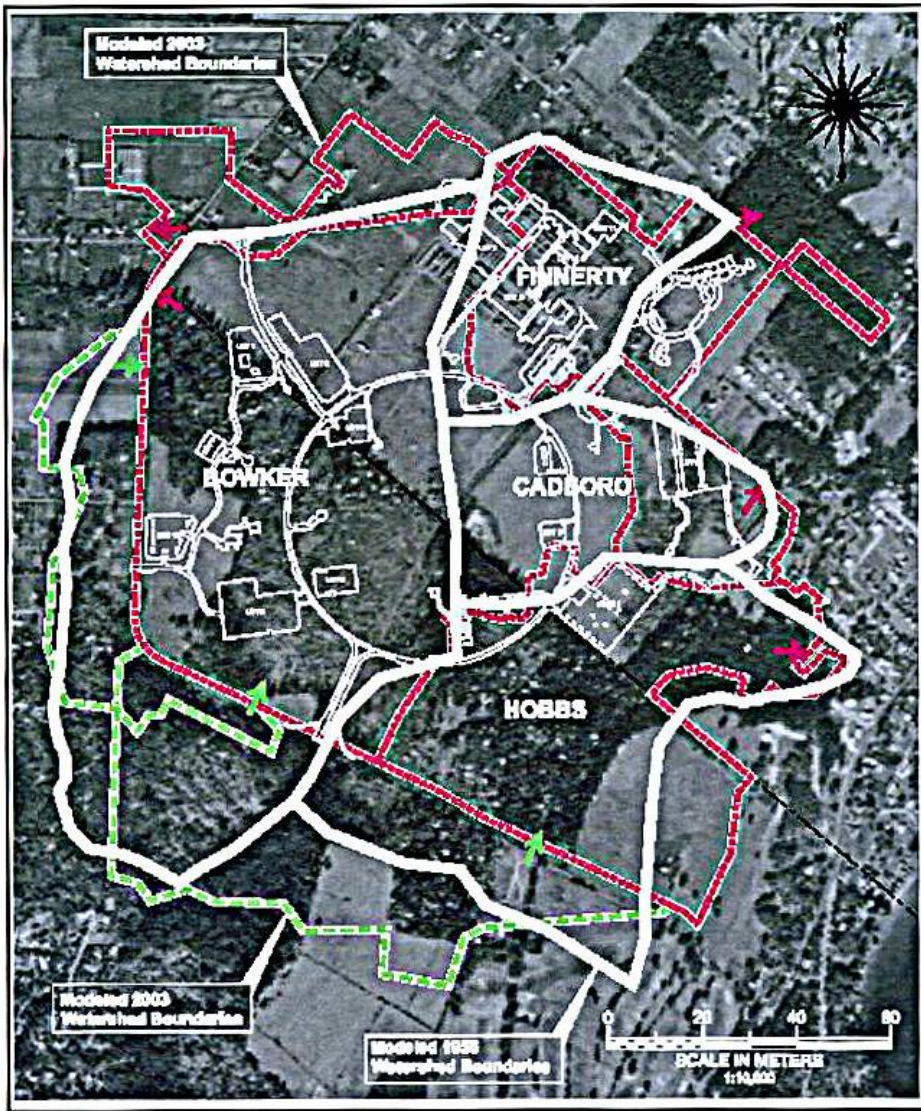
Appendix D - Site Geology Map (Thurber 2003)



Appendix E - Soil Assessment Summary (Lloyd 2004)



Appendix F –Watershed Boundaries (Lloyd 2004)



Appendix G –Watershed Characteristics (Lloyd 2004)

	Bowker Creek				Finnerty				Cadbora Bay				Hobbs Creek			
	Total Runoff		Peak Flow		Total Runoff		Peak Flow		Total Runoff		Peak Flow		Total Runoff		Peak Flow	
	Volume (m3)	Relative to 1956	Rate (m3/s)	Relative to 1956	Volume (m3)	Relative to 1956	Rate (m3/s)	Relative to 1956	Volume (m3)	Relative to 1956	Rate (m3/s)	Relative to 1956	Volume (m3)	Relative to 1956	Rate (m3/s)	Relative to 1956
Predevelopment	15,520		0.40		3,906		0.11		4,022		0.11		8,417		0.22	
1956 Campus Lands	20,950		0.55		11,560		0.67		5,487		0.17		9,806		0.26	
2003 UVic Campus - "As-Is"	46,180	2.2	1.92	3.5	11,530	1.0	0.81	1.2	5,084	0.9	0.41	2.4	26,760	2.7	0.98	3.8
2003 UVic Campus - with "BMP's"	38730	1.8	1.60	2.9	8855	0.8	0.64	1.0	4562	0.8	0.33	2.0	25580	2.6	0.84	3.3
2003 Campus Plan Buildout- "As-Is Technology"	53,910	2.6	2.03	3.7	11,530	1.0	0.81	1.2	5,339	1.0	0.43	2.6	26,870	2.7	0.99	3.9
2003 Campus Plan Buildout with BMP's	37,060	1.8	1.58	2.9	8,855	0.8	0.64	1.0	3,967	0.7	0.34	2.0	25,220	2.6	0.84	3.3

Appendix H – Changes in Hydrological Characteristics (Lloyd 2004)

Table 2.5. Predevelopment To 2003 Changes in Hydrologic Characteristics

Watershed	Drainage Area (ha)		% Impervious Area		Remarks
	1956	2003	1956	2003	
Bowker	92.9	100.4	1.6	51	Some areas within the campus now drain to Bowker Creek
Hobbs	50.7	66.8	0	31	Areas south of Cedar Hill Cross Road now drain to Hobbs
Finnerty	21.8	20.6	48	61	Little change
Cadboro	21.9	9.1	0	55	Loss of drainage area to Bowker Creek

The hydrologic effects of the change in drainage areas and the increase in impervious areas on runoff rates and volumes are illustrated in the bar graphs (Figure 2.6) for each watershed. The Hydrologic Summary Table 2.2 presents the numeric values of runoff volumes and flow rates. Comparisons of the runoff hydrographs are provided in Appendix B.

Appendix I –Bird Use of Wildlife Trees (Chatterson 1995)

Birds which have been sited on the University of Victoria campus that are known to use wildlife trees. (Adapted from Backhouse and Lousier, 1991).

Great Blue Heron: open nest on large tree limbs.
Hooded Merganser: secondary cavity nester.
Turkey Vulture: roosting.
Bald Eagle: open nest on large tree limbs, hunting perch, roost.
Red Tailed Hawk: hunting perch.
Merlin: Secondary cavity nester.
Great horned owl: secondary cavity nester, nest in broken tree top, hunting perch.
Barred Owl: secondary cavity nester, nest in broken tree top, winter roost.
Western Screech Owl: secondary cavity nester, winter roost.
Vaux's Swift: secondary cavity nester, roost.
Belted Kingfisher: hunting perch.
Red Breasted Sapsucker: primary cavity nester, roost, foraging.
Northern Flicker: primary cavity nester, roost, foraging.
Pileated Woodpecker: primary cavity nester, roost, foraging.
Downy Woodpecker: primary cavity nester, roost, foraging.
Hairy Woodpecker: primary cavity nester, roost, foraging.
Pacific Slope Flycatcher: secondary cavity nester, hawking perch.
Violet Green Swallow: secondary cavity nester.
Tree Swallow: secondary cavity nester.
Chestnut Backed Chickadee: primary cavity nester (opportunistic secondary cavity nester), foraging, winter roost.
Red Breasted Nuthatch: primary cavity nester, occasional secondary cavity nester, foraging, winter roost.
Brown Creeper: secondary cavity nester, foraging.
Bewick's Wren: secondary cavity nester.

Appendix J – UVic Bird Species (Chatterson 1995)

Bird Species of the University of Victoria Campus:

by Paul Levesque

Codes:

F = Seen by Biology 329 Friday morning birding trips

O = Seen by author and others in past four years

S = Seen on morning surveys, Spring 2000

H = Historical records predating 1990

COMMON NAME	CODE	COMMENTS
Double-crested Cormorant	O	few records, seen flying over campus
Great Blue Heron	F, O, S	commonly seen roosting and feeding in ponds, fall - spring
Turkey Vulture	F, O	large flocks soaring overhead in fall
Canada Goose	F, O, S	seen flying over campus
Trumpeter Swan	O	2 seen flying over campus on migration
Wood Duck	F	few records
Gadwall	F, H	few records
Eurasian Wigeon	F, O	two records
American Wigeon	F, O, S, H	common
Mallard	F, O, S, H	common, suspected nesting
Northern Shoveler	F, H	few recent records, historically common winter resident
Northern Pintail	F, O, H	few recent records, historically common winter resident
Green-winged Teal	F, O, H	overwinter on ponds
Hooded Merganser	F, O	few records
Bald Eagle	F, O, S	known to nest in Mystic Vale
Sharp-shinned Hawk	F, O, H	winter resident, low numbers
Copper's Hawk	F, O, S, H	known breeder, four nests in 1999
Red-tailed Hawk	F, O, S	uncommon, but seen regularly throughout the year
American Kestrel	H	no recent records
Merlin	F, O, S, H	an immature suckeyi was seen, Feb.12 and 17, 2000
Peregrine Falcon	F, H	few records
Ring-necked Pheasant	H	introduced, no recent records
California Quail	F, H	introduced ?, no recent records
Sandhill Crane	O	3 were seen flying over in migration, Oct. 99
Black-bellied Plover	H	no recent records, once common winter resident
American Golden-Plover	H	one sight record
Killdeer	F, O, H	year round resident, playing fields, nests
Willet	H	one sight record
Spotted Sandpiper	F	one sight record
Whimbrel	H	few records
Long-billed Curlew	H	one sight record

Western Sandpiper	H	no recent records, once common winter resident
Least Sandpiper	H	no recent records, once common winter resident
Pectoral Sandpiper	H	no recent records
Dunlin	H	no recent records, once common winter resident
Short-billed Dowitcher	H	no recent records, once common winter resident
Common Snipe	F, H	few recent records

Mew Gull	F, O	common winter resident
Herring Gull	F	few records

COMMON NAME	CODE	COMMENTS
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Thayer's Gull	F, O	small flocks frequent lawns and fields in winter months
Western Gull	F	few records
Glaucous-winged Gull	F, O, S, H	common resident
Rock Dove	F, O, S, H	introduced, common resident, likely breeding
Band-tailed Pigeon	F, O, H	few recent records, once nested in wooded areas
Mourning Dove	H	no recent records
Barn Owl	H	one sight record
Western Screech-Owl	H	historically nesting, now thought to be extirpated
Great Horned Owl	F, O, H	known to nest in Mystic Vale
Barred Owl	F, O, S, H	suspected nesting
Northern Saw-whet Owl	H	one found dead, hit by an automobile
Common Nighthawk	H	no recent records, historical nesting
Black Swift	O	few recent sight records
Vaux's Swift	F, O	few recent sight records
Anna's Hummingbird	F, O, S	year round resident, spring 2000 at least 8 pairs
Rufous Hummingbird	F, O, S, H	common summer, likely breeding
Red-breasted Sapsucker	F	few records
Downy Woodpecker	F, O, S, H	year round resident, spring 2000 at least 3 pairs
Hairy Woodpecker	F, O, S, H	one pair, nests
Northern Flicker	F, O, S, H	year round resident, at least 1 pair spring 2000, likely more
Pileated Woodpecker	F, O, S, H	year round resident, at least 1 pair spring 2000
Olive-sided Flycatcher	O, H	current status unclear, few recent records
Willow Flycatcher	H	current status unclear, few recent records
Pacific-slope Flycatcher	F, O, H	current status unclear, few recent records
Northern Shrike	O, H	few records, seen in winter, in apple orchards
Cassin's Vireo	F, H	few records, suspected nesting
Hutton's Vireo	O, S	few records, suspected nesting
Red-eyed Vireo	H	one record
Steller's Jay	F, O	common most winters, but unpredictable
Northwestern Crow	F, O, S, H	common, nests
Common Raven	F, O, S, H	nests, 1 pair in Mystic Vale spring 2000
Sky Lark	H, F	introduced, once nested, few recent records

Tree Swallow	F, O, H	common summer, suspected nesting
Violet-green Swallow	F, O, S, H	common summer, suspected nesting
Northern Rough-winged Swallow	O	few records
Cliff Swallow	O, H	historically nested on McPherson Library
Barn Swallow	F, O, H	common, nests in University Center parkade
Chestnut-backed Chickadee	F, O, S, H	nests, common in wooded areas
Bushtit	F, O, S, H	nests, common in wooded areas
Red-breasted Nuthatch	F, O, S, H	nests, common in wooded areas
Brown Creeper	F, O, S, H	nests, common in wooded areas
Bewick's Wren	F, O, S, H	nests, common in wooded areas
Winter Wren	F, O, S, H	nests, common in wooded areas
Golden-crowned Kinglet	F, O, S, H	year round resident, common, nests
Ruby-crowned Kinglet	F, O, S, H	winter resident, common
Swainson's Thrush	F, O, H	summer resident, nests
Hermit Thrush	F, H	uncommon winter resident
American Robin	F, O, S, H	common, nests
Varied Thrush	F, O, S, H	winter resident, low numbers
European Starling	F, O, S, H	introduced, common, likely breeding
COMMON NAME	CODE	COMMENTS
American Pipit	F, O, H	few recent records
Cedar Waxwing	F, O, H	small flocks< 30 frequent campus
Orange-crowned Warbler	F, O, S, H	suspected nesting, few overwinter
Yellow warbler	F, O, H	suspected nesting
Yellow-rumped Warbler	F, O, H	suspected nesting
Black-throated Gray Warbler	H,O	few records
Townsend's Warbler	F, O, H	suspected nesting
Northern Waterthrush	F	one record, struck window at Cunningham
MacGillivray's Warbler	F, O, H	suspected nesting
Wilson's Warbler	F, O, H	suspected nesting
Western Tanager	F	few records
Spotted Towhee	F, O, S, H	common year round resident, nests
Chipping Sparrow	F, H	few recent records
Savannah Sparrow	F, H	few recent records, historically nested
Fox Sparrow	F, O, S, H	wintering, low numbers
Song Sparrow	F, O, S, H	common, year round resident, low numbers, nests
White-crowned Sparrow	F, O, H	year round resident, low numbers, nests
Golden-crowned Sparrow	F, O	winter resident, low numbers
Harris's Sparrow	O	one sight record, Jan 98
Dark-eyed Junco	F, O, S, H	common, year round resident, nests
Black-headed Grosbeak	H	no recent records
Red-winged Blackbird	F, O, S, H	year round resident, low numbers

Western Meadowlark	H	no recent records, historically nested
Yellow-headed Blackbird	H	few records
Brewer's Blackbird	F, H	few recent records
Brown-headed Cowbird	F, H	probable nest parasite of nesting birds
Purple Finch	F, H	few recent records
House Finch	F, O, S, H	common, year round resident, suspected nesting
Red Crossbill	F, O, S, H	common, year round resident
Pine Siskin	F, O, S, H	common, year round resident, suspected nesting
American Goldfinch	F, O, S, H	spring, summer, fall, low numbers
Evening Grosbeak	O, H	few recent records of small flocks
House Sparrow	F, O, S, H	introduced, common, nests

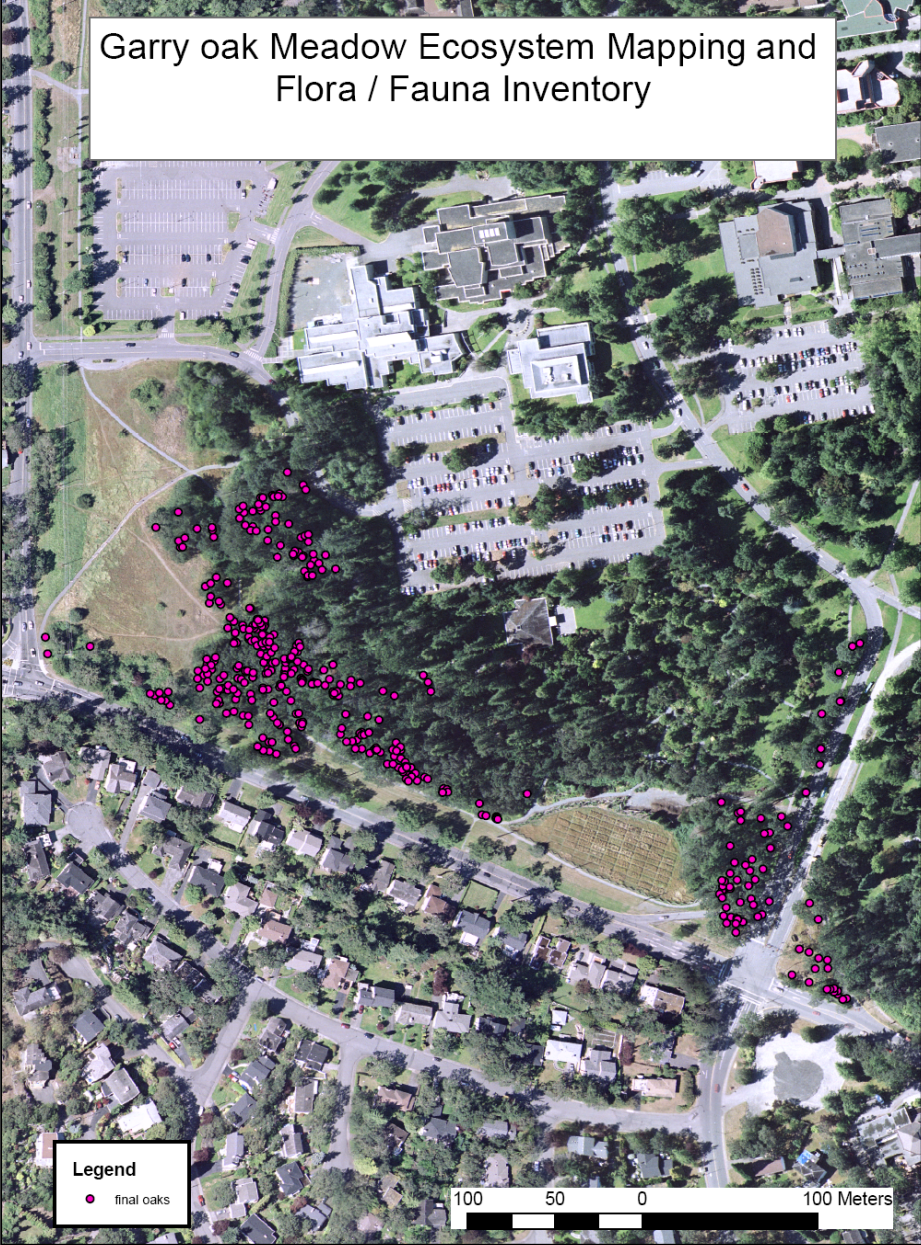
Species known to occur on campus, total: 123

Names and sequence of species are based on the American Ornithologist's Union Checklist of North American birds.

It should be noted that this list does not represent an exhaustive review of all literature and thus it is likely to be incomplete.







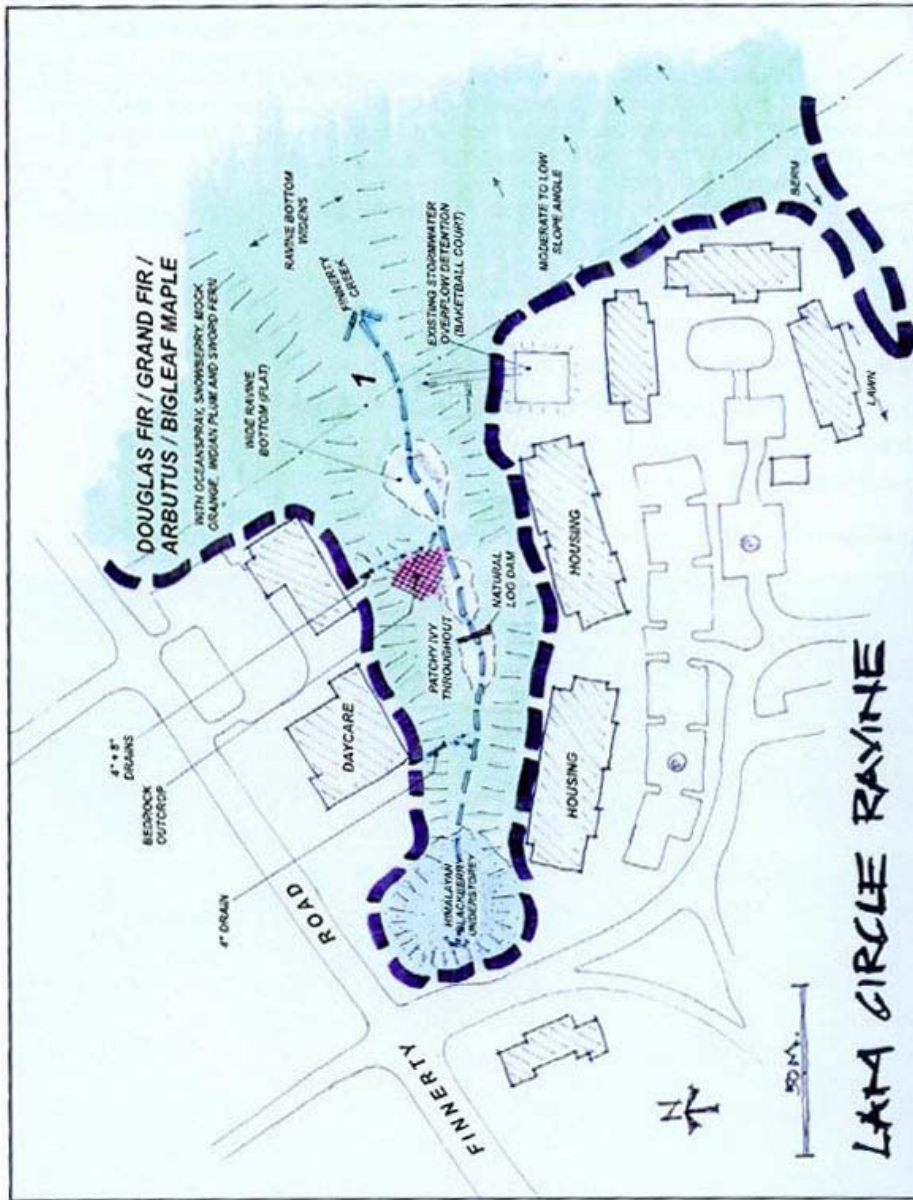
Appendix K – Garry Oak Meadow Species List (Bein & Eastman 2006)

Family Scientific Name

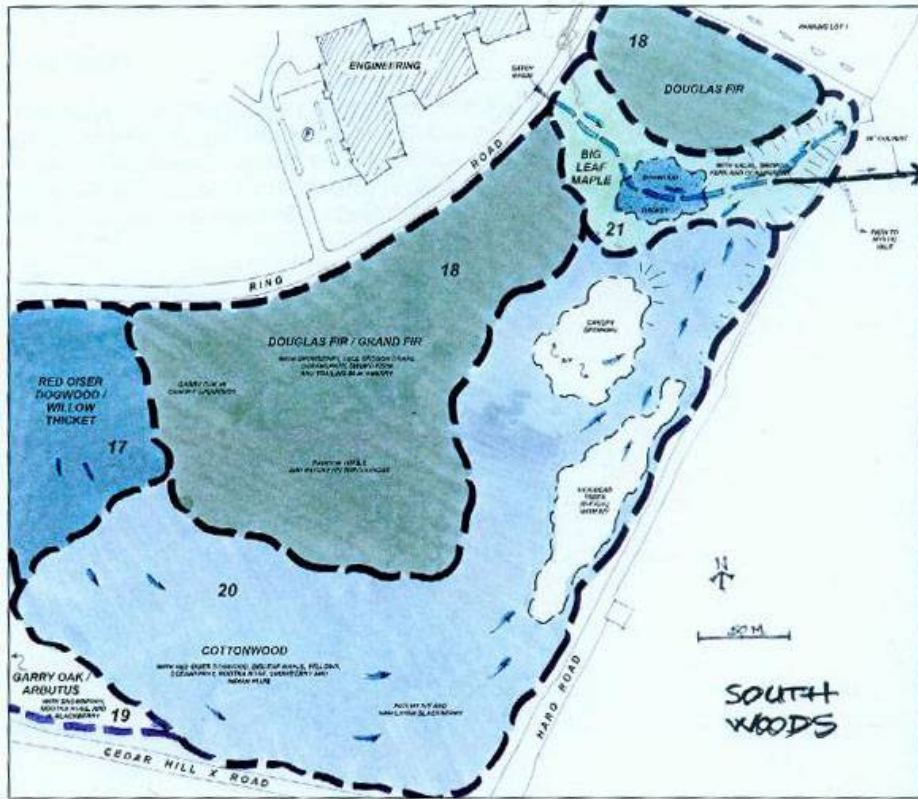
Asteraceae *Achillea millefolium*
Asteraceae *Bellis perennis*
Asteraceae *Cirsium vulgare*
Asteraceae *Hypochaeris radicata*
Asteraceae *Leucanthemum vulgare*
Asteraceae *Matricaria perforata*
Asteraceae - *Senecio sylvatica*
Asteraceae *Sonchus* sp. _____
Asteraceae *Taraxacum officinale*
Asteraceae *Tragopogon porrifolius*
Boraginaceae *Myosotis discolor*
Brassicaceae *Brassica* sp. (?)
Brassicaceae *Capsella bursa-pastoris*
Brassicaceae *Lepidium* sp.
Brassicaceae *Raphanus* sp.
Brassicaceae *Sisymbrium officinale*
Caryophyllaceae *Spergula arvensis*
Caryophyllaceae *Suaeda frutescens*
Caryophyllaceae *Stellaria media*
Chenopodiaceae *Chenopodium album*
Compositae *Daucus carota*
Compositae *Sanicula crassicaulis*
Fabaceae *Cytisus scoparius*
Fabaceae *Lupinus bicolor*
Fabaceae *Medicago arabica*
Fabaceae *Trifolium dubium*
Fabaceae *Trifolium pratense*
Fabaceae *Trifolium repens*
Fabaceae *Vicia hirsuta*
Fabaceae *Vicia sativa*
Geraniaceae *Erigodium* sp.
Geraniaceae *Geranium* sp.
Juncaceae *Juncus bufonius*
Lilaceae *Camassia leichtlinii*
Lilaceae *Camassia guamash*
Lilaceae *Erythronium* spp.
Orchidaceae *Spiranthes romanoffiana*
Plantaginaceae *Plantago lanceolata*
Poaceae *Agrostis* sp.
Poaceae *Anthoxanthum odoratum*

Poaceae *Arrhenatherum elatius*
Poaceae *Bromus sitchensis*
Poaceae *Bromus* sp. 1
Poaceae *Bromus* sp. 2
Poaceae *Cynosurus cristatus*
Poaceae *Dactylis glomerata*
Poaceae *Danthonia californica*
Poaceae *Elymus glaucus*
Poaceae *Elymus repens*
Poaceae *Festuca* sp.
Poaceae *Holcus lanatus*
Poaceae *Lolium perenne*
Poaceae *Phleum pratense*
Poaceae *Poa annua*
Poaceae *Poa pratensis*
Poaceae unknown grass
Poaceae *Vulpia myuros*
Polemoniaceae *Navarretia squarrosa*
Polygonaceae *Amaranthus*
Polygonaceae *Polygonum aviculare*
Polygonaceae *Rumex acetosella*
Polygonaceae *Rumex crispus*
Portulacaceae *Montia linearis*
Portulacaceae *Portulacca*
Primulaceae *Dodecatheon hendersonii*
Ranunculaceae *Ranunculus occidentalis*
Rosaceae *Crataegus monogyna*
Rosaceae *Fragaria vesca*
Rosaceae *Rosa nutkana*
Rosaceae *Rubus armeniacus*
Rosaceae *Rubus ursinus*
Scrophulariaceae *Veronica* spp.
Solanaceae *Solanum* or *Physolus*

Appendix L – Lam Circle Ravine (Lloyd 2004)



Appendix M – South Woods (Lloyd 2004)



Appendix N – UVic Native Plant Garden (Herbarium 2001)

Native plants in the UVIC native plant garden as at July 2001:

Achlys triphylla – Vanilla-leaf
Adiantum pedatum – Northern Maiden-hair Fern
Allium cernuum - Nodding Onion
Amelanchier alnifolia - Saskatoon
Aquilegia formosa - Columbine
Arctostaphylos uva-ursi - Kinnikinnik
Aruncus dioicus - Goat's Beard
Artemisia tridentata – Sagebrush
Aster subspicatus – Douglas' aster
Athyrium filix-femina - Lady Fern
Blechnum spicant - Deer Fern
Camassia leichtlinii - Great Camas
Camassia quamash - Common camas
Ceanothus velutinus - Snowbrush
Cornus stolonifera – Red-Osier Dogwood
Delphinium menziesii – Menzies' Larkspur
Dicentra formosa - Bleeding heart
Disporum smithii - Fairy Bells
Dodecatheon cusickii - Cusick's Shootingstar
Dodecatheon hendersonii - Henderson's Shootingstar
Dodecatheon meadia - Shootingstar
Dodecatheon pulchellum - Few-flowered Shootingstar
Dryopteris expansa – Sping wood fern
Eriophyllum lanatum - Woolly Sunflower
Erythronium oregonum - Easter lily
Erythronium revolutum - Pink Easter lily
Fauri crista-galli – Deer-cabbage
Fragaria chiloensis - Coastal strawberry
Fragaria vesca - Wild strawberry
Gaultheria shallon – Salal
Geranium viscosissimum – Sticky geranium
Gymnocarpium dryopteris - Oak fern
Gymnocarpium robertianum – Oak fern
Heuchera micrantha – Small-flowered Alum Root
Iliamna rivularis - Stream globe-mallow
Iris setosa - Northern Flag
Ledum groenlandicum - Labrador Tea
Linnaea borealis - Twinflower
Lonicera ciliosa - Orange Honeysuckle

Mahonia aquifolium - Tall Oregon Grape
Mahonia nervosa - Dull Oregon Grape
Maianthemum dilatatum - False lily-of-the-Valley
Malus fusca – Pacific crabapple
Matteucia struthiopteris - Ostrich Fern
Mimulus guttatus - Yellow Monkey-Flower
Mitella ovalis – Oval-leaved Mitrewort
Oemleria cerasiformis – Indian-Plum
Oplopanax horridus – Devil’s club
Oxalis oregana -Oregon Sorrel
Pachistima myrsinites - False box
Penstemon fruticosus - Shrubby Penstemon
Philadelphus lewisii - Mock Orange
Physocarpus capitata - Ninebark
Potentilla fruticosa - Shrubby Cinquefoil
Polypodium glycyrrhiza -Licorice Fern
Polystichum braunii - Braun's Holly Fern
Polystichum munitum – Sword fern
Quercus garryana – Garry oak
Rhododendron albiflorum – White-flowered rhododendron
Rhododendron macrophyllum – Pacific rhododendron
Ribes divaricatum - Wild Gooseberry
Ribes lacustre - Black Gooseberry
Ribes laxiflorum – Trailing Black Currant
Ribes lobbii - Gummy Gooseberry
Ribes sanguineum - Red-flowering Currant
Ribes viscosissimum – Sticky currant
Rosa gymnocarpa -Bald Hip Rose
Rosa nutkana - Nootka Rose
Sambucus racemosa - Red Elderberry
Saxifraga integrifolia – Grassland saxifrage
Sedum spathulifolium – Broad-leaved Stonecrop
Shepherdia canadensis - Soapberry
Sisyrinchium californicum -Yellow-eyed Grass
Sisyrinchium douglasii - Satin Flower
Smilacina racemosa - False Solomon's Seal
Solidago canadensis – Goldenrod
Sorbus stichensis – Mountain ash
Spiraea betulifolia – Birch-leaved spirea
Symphoricarpos albus –Snowberry
Symphoricarpos mollis – Trailing snowberry
Tellima grandiflora - Fringecup
Tiarella trifoliata - Foamflower
Tolmiea menziesii - Piggy-back Plant
Trautvettaria caroliniensis - False Bugbane

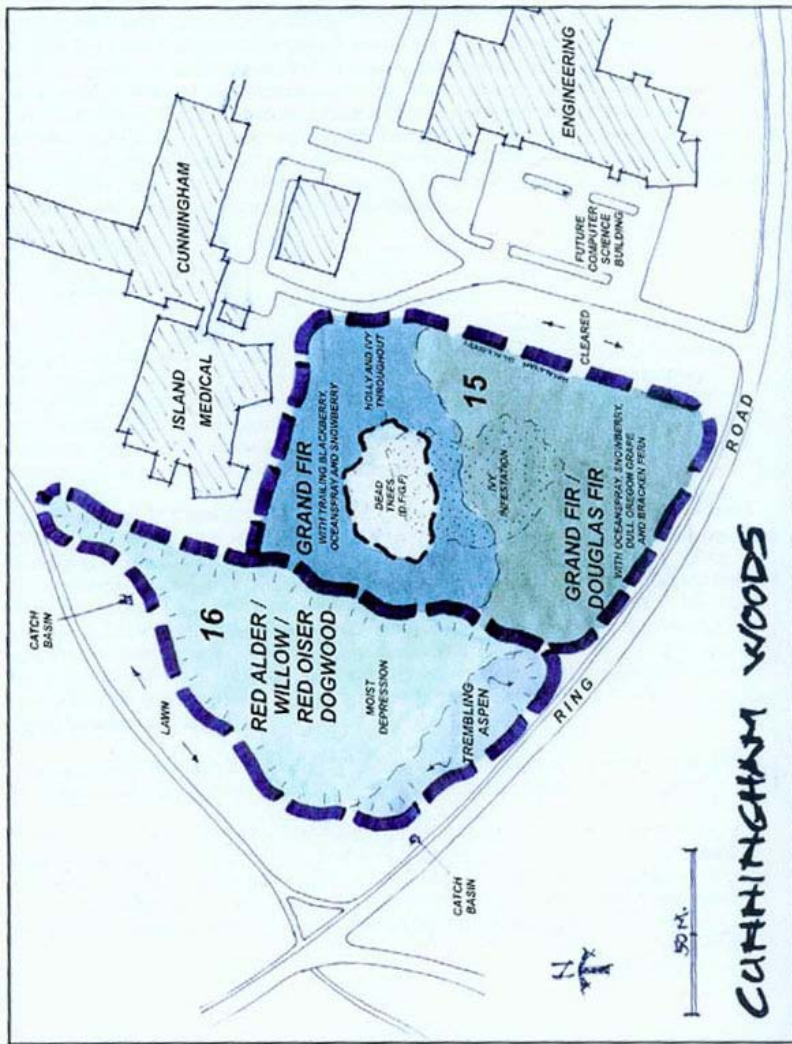
Trillium ovatum - Trillium
Triteleia hyacinthina - Fool's Onion
Vaccinium parvifolium - Red Huckleberry
Vaccinium ovatum - Evergreen Huckleberry
Vaccinium vitis-idaea - Lingonberry
Viburnum edule - Highbush Cranberry
Viola glabella - Stream Violet
Woodwardia fimbriata - Giant Chain Fern
Xerophyllum tenax – Bear grass
Zygadenus venenosus - Death Camas

For more information see the following references:

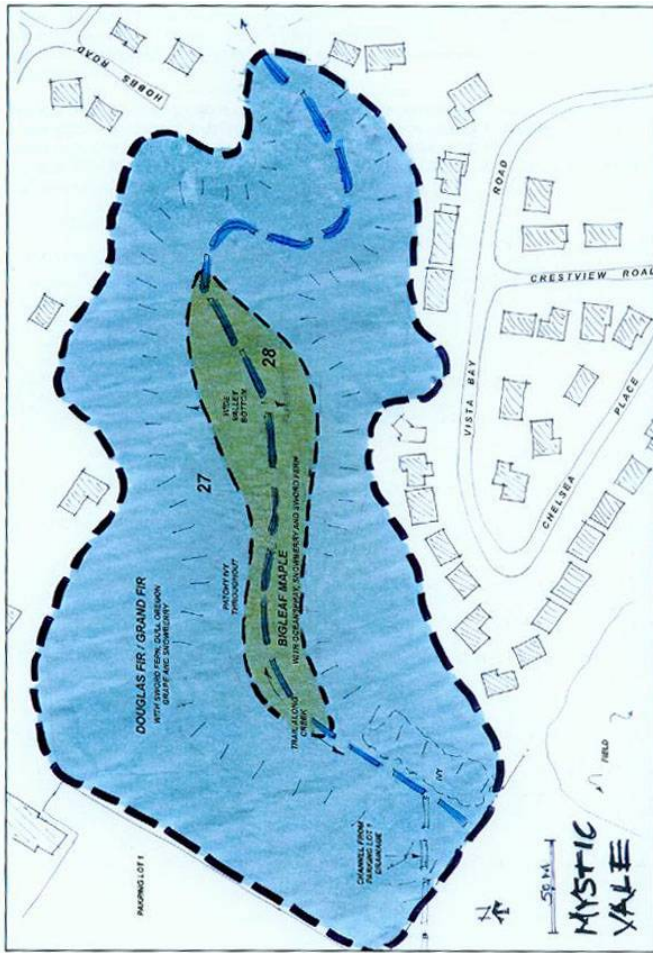
Native Plants in the Coastal Garden. 1996. April Pettinger. Whitecap Books, Vancouver, BC.

Plants of Coastal British Columbia. 1994. Jim Pojar and Andy Mackinnon. Lone Pine Press, Vancouver, BC.

Appendix O – Cunningham Woods (Lloyd 2004)



Appendix P – Mystic Vale (Lloyd 2004)



R

Appendix Q– Native Plants of Mystic Vale (Turner 1993)

NATIVE PLANTS OF MYSTIC VALE, SAANICH, BRITISH COLUMBIA

Nancy J. Turner and Brett Heneke
Environmental Studies Program
University of Victoria

January 20, 1993 (updated
March, 1993)

List of Plant Species from Brief Survey of rim, slopes and creekside areas of Mystic Vale. - Please note that many herbaceous perennials and annual plant species are not visible at this time of year. (Species listed alphabetically by scientific name within major categories of TREES, SHRUBS, HERBACEOUS FLOWERING PLANTS, FERNS AND FERN-ALLIES, MOSSES AND LIVERWORTS. A note on LICHENS and FUNGI is also made.

TREES

Grand fir (*Abies grandis*)
Broadleaf maple (*Acer macrophyllum*)
Red alder (*Alnus rubra*)
Arbutus (*Arbutus menziesii*)
Black cottonwood (*Populus balsamifera*
ssp. *trichocarpa*)
Bitter cherry (*Prunus emarginata*)
Douglas-fir (*Pseudotsuga menziesii*)
Cascara (*Rhamnus purshiana*)
Hooker's willow (*Salix hookeriana*)
Scouler's willow (*Salix scouleriana*)
Sitka willow (*Salix sitchensis*)
Western red-cedar (*Thuja plicata*)
Pacific yew (*Taxus brevifolia*)

SHRUBS

Saskatoon berry (*Amelanchier alnifolia*)
Red-osier dogwood (*Cornus stolonifera* ;
syn. *Cornus sericea*)
Salal (*Gaultheria shallon*)
Oceanspray (*Holodiscus discolor*)
Orange-flowered honeysuckle (*Lonicera ciliosa*)
Hairy honeysuckle (*Lonicera hispidula*)
Tall Oregon-grape (*Mahonia aquifolium*;
syn. *Berberis aquifolium*)
Common Oregon-grape (*Mahonia nervosa* ; syn. *Berberis nervosa*)
Indian-plum (*Oemleria cerasiformis*)
False box (*Pachistima myrsinites*)
Mock-orange (*Philadelphus lewisii*)
stink currant (*Ribes bracteosum*)
black gooseberry (*Ribes divaricatum*)
Red-flowering currant (*Ribes sanguineum*)
Dwarf wild rose (*Rosa gymnocarpa*)
Nootka rose (*Rosa nutkana*)
Thimbleberry (*Rubus parviflorus*)

Salmonberry (*Rubus spectabilis*)
Trailing wild blackberry (*Rubus ursinus*)
Red elderberry (*Sambucus racemosa*)
Snowberry, or waxberry (*Symphoricarpos albus*)
Red huckleberry (*Vaccinium parvifolium*)

HERBACEOUS FLOWERING PLANTS

Vanilla-leaf (*Achlys triphylla*)
Sedge (*Carex* spp.)
Coralroot (*Corallorhiza maculata*)
Sweet-scented bedstraw (*Galium triflorum*)
Large-leaved avens (*Geum macrophyllum*)
Rattlesnake plantain orchid (*Goodyera oblongifolia*)
Purple pea (*Lathyrus nevadensis*)
Twinflower (*Linnaea borealis*)
Wood-rush (*Luzula* sp.)
Skunk-cabbage (*Lysichitum americanum*)
Indian pipe (*Monotropa uniflora*)
#Siberian miner's-lettuce (*Montia sibirica*)
Nemophila (*Nemophila parviflora*)
Water-parsley (*Oenanthe sarmentosa*)
#Sweet cicely (*Osmorhiza ? purpurea*)
Sanicle (*Sanicula crassicaulis*)
Yerba buena (*Satureja douglasii*)
False Solomon's-seal (*Smilacina racemosa*)
Hedge-nettle (*Stachys cooleyae*)
#Common twisted-stalk (*Streptopus amplexifolius*)
Tall fringe-cup (*Tellima grandiflora*)
Fringe-cup (*Tiarella trifoliata*)
Starflower (*Trientalis latifolia*)
Western trillium (*Trillium ovatum*)
Stinging nettle (*Urtica dioica*)

(NOTE: a number of grass species were also observed,
but not identified)

additional species from May, 1993

FERNS AND FERN-ALLIES

Lady fern (*Athyrium filix-femina*)
Spiny wood fern (*Dryopteris expansa*)
Common horsetail (*Equisetum arvense*)
Branchless horsetail (*Equisetum hiemale*)
Giant horsetail (*Equisetum telmateia*)
Licorice fern (*Polypodium glycyrrhiza*)
Sword fern (*Polystichum munitum*) (NOTE: Mystic Vale contains one of the most spectacular populations of sword fern anywhere on southern Vancouver Island)
Bracken fern (*Pteridium aquilinum*)

SOME MOSSES AND LIVERWORTS

(NOTE: This list is very incomplete, representing only a fraction of the species occurring in the Vale)

Antitrichia moss (*Antitrichia curtispendula*)
Fork moss (*Dicranum scoparium*)
Hypnum moss (*Hypnum circinale*)

Stolon moss (*Isoetecium myosuroides* ; syn. *I. stoloniferum* , *I. spiculiferum*)
Oregon feather moss (*Kindbergia oregana* ; syn. *Eurhynchium oreganum*)
Feather moss (*Kindbergia praelonga*; syn. *Eurhynchium praelongum*)
Palm-tree moss (*Leucopelis menziesii*)
Douglas neckera moss (*Neckera douglasii*)
Neckera moss (*Metaneckera menziesii*)
Mnium moss(*Plagiommium insigne*)
Plagiothecium moss (*Plagiothecium undulatum*)
Leafy liverwort (*Porella navicularis*)
Mnium moss(*Rhizomnium glabrescens*)
Feather moss (*Rhytidiadelphus loreus*)
Triangle-leaved feather moss (*Rhytidiadelphus triquetrus*)
Leafy liverwort (*Scapania bolanderi*)

NOTE ON LICHENS and FUNGI

A complete inventory of Mosses, Liverworts, Lichens and Fungi in the Mystic Vale area should be made. A few identifiable lichens seen include: *Ochrolechia* sp.; *Cladonia* spp.; *Cetraria* spp.; *Platismatia glauca*; *Parmelia sulcata*; *Hypogymnia physodes*; *Peltigera* sp.; *Usnea hirta* . A wide variety of fungi, including mushrooms and tree fungi, also occur in the area, contributing to the overall biodiversity.

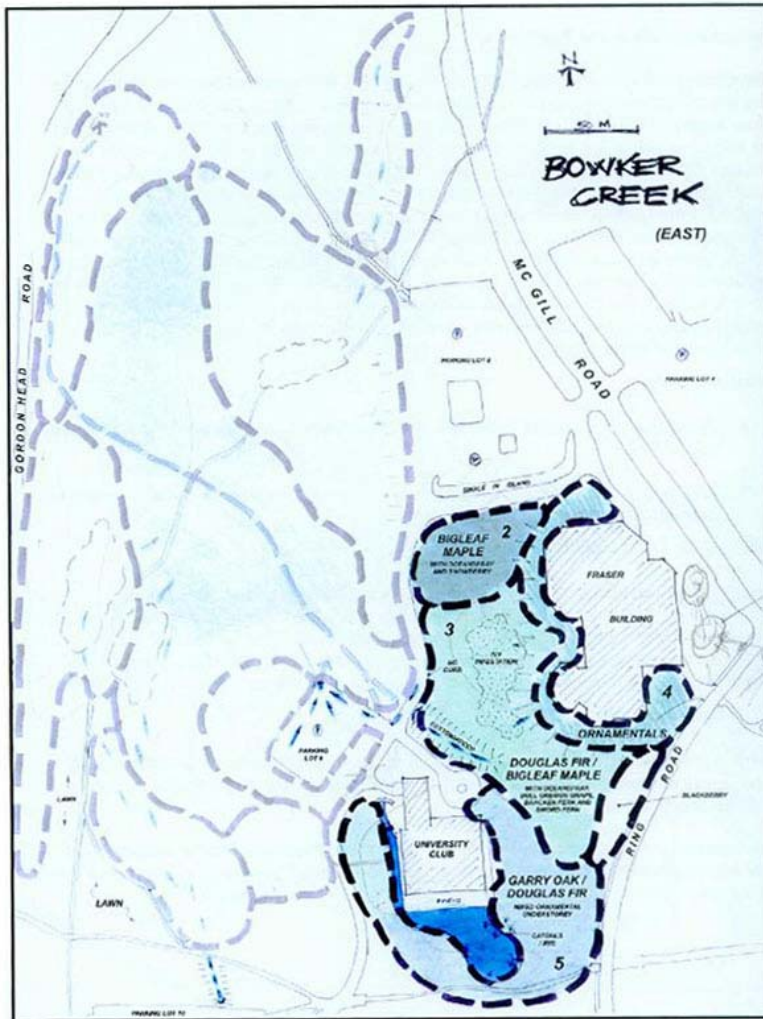
BIRDS

NOTE: It is particularly important to survey this area on a year-round basis, not just over a short period, because the woods of Mystic Vale and surrounding areas may provide critical habitat not just for resident bird species, like winter wren and rufous-sided towhee, but also for migratory species, which need these areas for resting and feeding on their northward and southward journeys. Woodpeckers abound in the vale, as do a wide variety of small songbirds--kinglets, bush tits, juncos, creepers, wrens. Owls, eagles and other raptors need the tall trees and snags for nesting and perching.

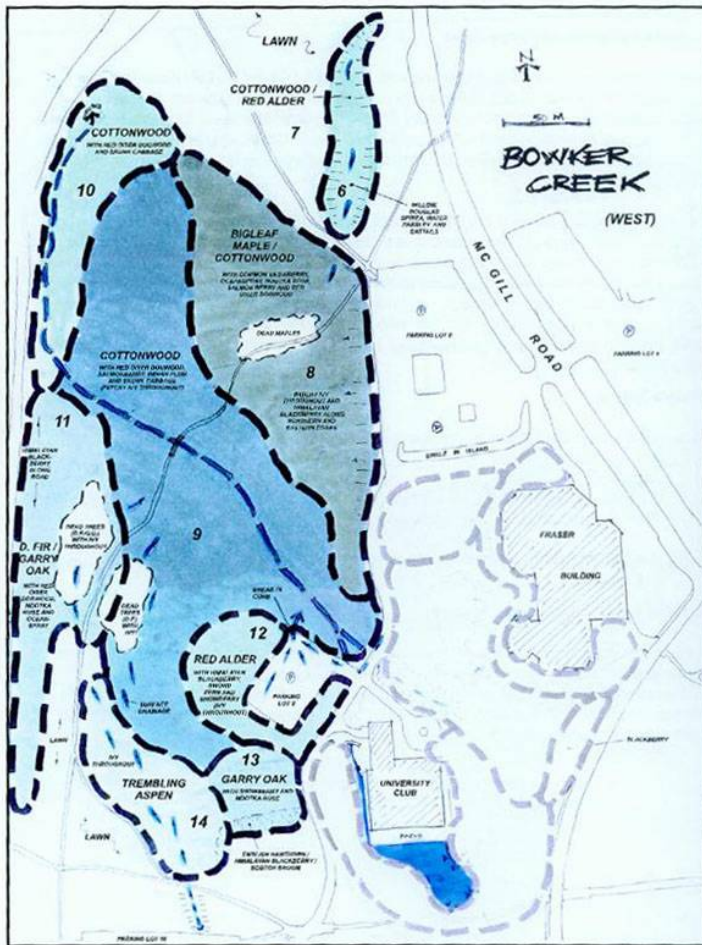
Appendix R – Upper Hobbs Creek (Lloyd 2004)



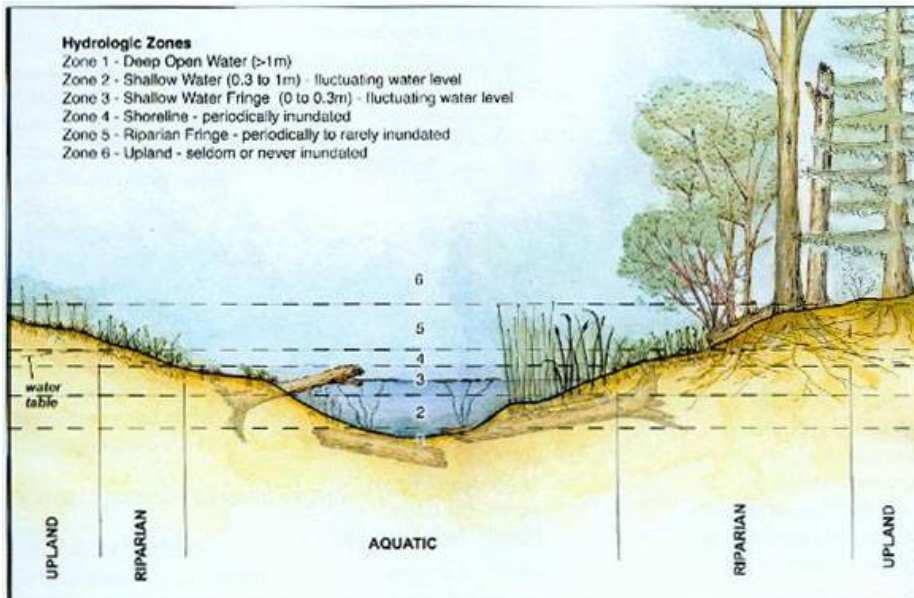
Appendix S – Bowker Creek East (Lloyd 2004)



Appendix T – Bowker Creek West (Lloyd 2004)



Appendix Ua – Hydrological Zones (Source: Lloyd 2004)



Appendix Ub –Proposed Planting List (Lloyd 2004)

Zone 1 - Deep Open Water (>1 m)

No rooted vegetation

Zone 2 - Shallow water (0.30m to 1 m) - fluctuating water level

<i>Sagittaria latifolia</i>	wapato, arrowhead
<i>Scirpus acutus</i>	hard-stemmed bulrush
<i>Scirpus microcarpus</i>	small-flowered bulrush
<i>Typha latifolia</i>	cattail

Zone 3 - Shallow water fringe (0-0.30 m) - fluctuating water, regularly inundated

<i>Cornus stolonifera</i>	red-osier dogwood
<i>Salix hookeriana</i>	Hooker's willow
<i>Salix lucida (lasiandra)</i>	Pacific willow
<i>Salix scouleriana</i>	Scouler's willow
<i>Salix sitchensis</i>	Sitka willow
<i>Spiraea douglasii</i>	hardhack
<i>Carex mertensii</i>	Merten's sedge
<i>Carex obnupta</i>	slough sedge
<i>Carex rostrata</i>	beaked Sedge
<i>Carex sitchensis</i>	Sitka Sedge
<i>Carex stipata</i>	sawbeak Sedge
<i>Juncus effusus</i>	common Rush
<i>Juncus ensifolius</i>	dagger-leaf Rush
<i>Lysichiton americanum</i>	skunk cabbage
<i>Oenanthe sarmentosa</i>	Pacific water-parsley
<i>Typha latifolia</i>	cattail

Zone 4 - Shoreline - periodically inundated

<i>Populus trichocarpa</i>	black cottonwood
<i>Cornus stolonifera</i>	red-osier dogwood
<i>Crataegus douglasii</i>	black hawthorn
<i>Lonicera involucrata</i>	black twinberry
<i>Rhamnus purshiana</i>	casacara
<i>Rubus spectabilis</i>	salmonberry
<i>Salix hookeriana</i>	Hooker's willow
<i>Salix lucida (lasiandra)</i>	Pacific willow
<i>Salix scouleriana</i>	Scouler's willow
<i>Salix sitchensis</i>	Sitka willow
<i>Sambucus racemosa</i>	red elderberry
<i>Spiraea douglasii</i>	hardhack
<i>Carex mertensii</i>	Merten's sedge
<i>Carex obnupta</i>	slough sedge
<i>Carex rostrata</i>	beaked Sedge
<i>Carex sitchensis</i>	Sitka Sedge
<i>Carex stipata</i>	sawbeak Sedge
<i>Juncus effusus</i>	common Rush
<i>Juncus ensifolius</i>	dagger-leaf Rush
<i>Lysichiton americanum</i>	skunk cabbage

Zone 5 - Riparian Fringe - rarely inundated

<i>Alnus rubra</i>	red alder
<i>Populus trichocarpa</i>	black cottonwood
<i>Thuja plicata</i>	western red cedar
<i>Cornus stolonifera</i>	red-osier dogwood
<i>Crataegus douglasii</i>	black hawthorn
<i>Lonicera involucrata</i>	black twinberry
<i>Physocarpus capitus</i>	Pacific ninebark
<i>Populus tremuloides</i>	trembling aspen
<i>Rhamnus purshiana</i>	cascara
<i>Rubus parviflorus</i>	thimbleberry
<i>Rubus spectabilis</i>	salmonberry
<i>Salix hookeriana</i>	Hooker's willow
<i>Salix lucida (lasiandra)</i>	Pacific willow
<i>Salix scouleriana</i>	Scouler's willow
<i>Salix sitchensis</i>	Sitka willow
<i>Sambucus racemosa</i>	red elderberry
<i>Spiraea douglasii</i>	hardhack
<i>Athyrium felix-femina</i>	lady fern
<i>Aruncus sylvester</i>	goat's beard
<i>Blechnum spicant</i>	deer fern
<i>Polystichum munitum</i>	sword fern
<i>Pteridium aquilinum</i>	bracken fern

Zone 6 - Upland - seldom or never inundated

<i>Acer macrophyllum</i>	bigleaf maple
<i>Malus fusca (Pyrus fusca)</i>	Pacific crab apple
<i>Prunus emarginata</i>	bitter cherry
<i>Quercus garryana</i>	Garry oak
<i>Thuja plicata</i>	western red cedar
<i>Amelanchier alnifolia</i>	saskatoon
<i>Arctostaphylos uva-ursi</i>	kinnickinick
<i>Holodiscus discolor</i>	oceanspray
<i>Mahonia nervosa</i>	dull Oregon grape
<i>Oemleria cerasiformis</i>	Indian plum
<i>Philadelphus lewisii 'Gordianus'</i>	mock orange (Coastal)
<i>Ribes sanguineum</i>	red flowering currant
<i>Rosa gymnocarpa</i>	baldhip rose
<i>Rosa nutkana</i>	Nootka rose
<i>Rosa pisocarpa</i>	clustered wild rose
<i>Rubus parviflorus</i>	thimbleberry
<i>Rubus spectabilis</i>	salmonberry
<i>Sorbus sitchensis</i>	Sitka mountain ash
<i>Symphoricarpos albus</i>	common snowberry
<i>Vaccinium membranaceum</i>	black huckleberry
<i>Polystichum munitum</i>	sword fern
<i>Pteridium aquilinum</i>	bracken fern

Appendix V –Plot Attribute Data

Plot 1: Ravine: 10m plot: Sept. 25th
NW Slope

% cover	Species		Notes
20-25	Sword Fern	Dominant	lots of bare exposed soil blocks of concrete 5 erratics: from road?
>1	English Ivy		
>1	Holly		
5	Trailing Blackberry	Sub- dominant	
40	Moss (mezies?)		
>1	Indian Plum		
	Start Flowered		
>1	Solomons		
>1	Dull Oregon Grape		
>1	Cascara		
>1	Ocean Spray		

Plot 2: Ravine: 10m plot: Sept. 25th
SE Slope

% cover	Species		Notes
5	Sword Fern		No undergrowth under holly
15-Oct	Snowberry		Less undergrowth as you move from the ravine
2	Trailing blackberry		
15-20	Dull Oregon Grape		
>1	Red Huckleberry		
5	Indian Plum		
1	English Ivy		
>1	Balhip Rose		
>1	Bracken Fern		
>1	Himalayan Blackberry		
10	Holly		
20-25	Salal	Dominant	
		Co-	
20-25	Ocean Spray	dominant	
>1	Western Trumpet Honeysuckle		
>1	Unknown Tree from plot # 1		
2	Unknown Tree - see sample		
10	Unknown Moss (?)		

Plot 3: Ravine: 10m plot: Sept. 25th
Upper Ravine/Middle

% cover	Species		Notes
2	Mexican Hedge Nettle		
25 to 30	Creeping Buttercup	Dominant	Two distinct sections, one lower near the ravine
2	Trailing Blackberry		dominated by creeping buttercup with a subdominant
3 to 5	Lady Fern		hedge nettle. The rest is a mix of shrubs (Snowberry and Salal)
30	Snowberry	Co-dominant	with a Dogwood subcanopy. No trees in quadrant.
5	Ocean Spray		Saw a hummingbird Found owl pellets nearby
2	Baldhip Rose		
7 to 10	Bracken Fern		Thumble berry patch
5	Sword Fern		Hawthorn
>1	English Ivy		Huckleberry on NW Slope
2	Indian Plum		>1 Laurel
1	Sitka Sedge		>1 Thistle (Canada Thistle)
>1	Grass (?)		other mosses
20	Dogwood	Co-dominant	sm >10m W.Redcedar
1	Licorice Fern		>1 Cascara
10	Holly		
>1	Nootka rose		
1	Large Leaved Avens		
>1	Red Huckelberry		
10	Salal		
>1	Unknown A: Cleaver?		
>1	Unknown B: Solomons Seal?		
>1	Unknown C: Fireweed?		
40	Unknown D: Moss		
5	Unknown E: Tree with spikes		
>1	Unknown F: English Plantain?		

Plot 4: Cottonwoods next to Haro Rd. :

10m plot: Sept. 26th

% cover	Species		Notes
25	Dogwood	Co-dominant	Likely a depression.
25	Snowberry	Sub-dominant	Lots of leaf litter in open areas.
40-50	English Ivy	Dominant	Several fallen Alders swarmed with Ivy.
>1	Trailing blackberry		Bug infestation in Indian Plum.
>1	Large Leaved Aven		
>1	Sword Fern		

- 10 Indian Plum
- >1 Himalyan Blackberry
- >1 Baldhip Rose
- >1 Lichen
- >1 Soloman Seal (?)
- 2 Ocean Spray
- 1 Unknown A: Tree
- 10 Unknown B: Moss
- >1 Unknown C: Lichen

Plot 5: Cottonwoods next to compost site: 10m plot: Sept. 27th

% cover	Species		Notes
90 to 95	English Ivy	Dominant	Grey squirell
40	Trailing Blackberry		Ivy everywhere, on all trees except under spruce (too wet)
5	Ocean Spray		
15-20	Sword Fern		
10	Dull Oregon Grape		
3 to 5	Snowberry		
3 to 5	Dogwood		
1	Holly		
>1	Daphne		
>1	Bracken Fern		
>1	Nootka Rose		
>1	Pathfinder		
>1	Sitka Sedge		

Plot 6: Cottonwood Edge: 10m Plot: Sept. 27th

% cover	Species		Notes
2	Indian Plum		Ground covered in leaf litter. No herb
25 to 30	Dogwood		undergrowth.
40 to 50	Nootka Rose	Sub-dominant	Depresion?
80 to 90	Snowberry	Dominant	10-20cm dbh' Cottonwoods
1	Trailing Blackberry		
>1	Bracken Fern		
2	Ocean Spray		
>1	Grass		
>1	Unknown A: Shrub/Tree Douglas Maple (?)		
	Unknown B: Star Flowered Solomons		
>1	(?)		

Plot 7: S. Woods. Garry Oak Rd. Edge: 10m plot: Sept. 27th

% cover	Species	Notes
40 to 50	Snowberry	More Star Flowered Solomons than elsewhere
10	Ocean Spray	~15 individuals
5 to 10	Baldhip Rose	Farside of Rd, is Garry Oaks, is this just a remenant fringe?
>5	Holly	
>5	Red Honeysuckle	
>5	Nootka Rose	
>1	Star Flowered Solomon (?)	
>1	Daphne	
>1	Trailing Blackberry	
1	Indian Plum	
(?)	Saskatoon	
>1	Unknown A: Pacific Crab Apple (?)	

Plot 8: "Death Zone": 10m Plot: Sept. 27th

% cover	Species	Notes
50 to 60	Snowberry	
30 to 40	Trailing Blackberry	
40 to 50	Dull Oregon Grape	
>5	Bracken Fern	
>5	Pathfinder	
>5	Wall Lettuce	
>1	Thimble Berry	
>1	Grass	
>1	Cleaver	
5	Holly	
>5	Sword Fern	
50	English Ivy	
>5	Baldhip rose	
1	Indian Plum	

Plot 27*:S.Woods Mixed w/ Understory: 10m Plot

% cover	Species	Notes
40 to 50	Salal	Across from root wall.
30 to 40	Ocean Spray	Huckleberry 1/2 m ² . (along coverage walk)
10	Snowberry	

- 10 Holly
- >1 Bracken Fern
- 3 Sword Fern
- 5 to 10 Trailing Blackberry
- >1 Red Honeysuckle
- 10 Cascara
- 10 Baldhip Rose
- 3 English Ivy
- >1 Licorice Fern*
- >1 Thimble Berry
- 3 Dull Oregon Grape
- 1 Grass
- 10 Cherry
- >1 Pea (Purple Pea Vine)
- >1 Unknown A: Vine (Whipple Vine)

Plot 9: Mixed Conifer: 10m Plot: Oct 4th

% cover	Species	Notes
95 to 100	English Ivy	Hawthorn and Cascara found around but not in plot.
15 to 20	Snowberry	
5 to 10	Bracken Fern	
5 to 10	Baldhip Rose	
>5	Trailing Blcakberry	
1	Holly	
>1	Uknown A: Solomans Seal?	
>3	Uknown B: Hawthorn	

Plot 10: SW. Thicket: 10m Plot: Oct 4th

% cover	Species	Notes
45 to 50	Dogwood	Snag Conifer Baby Grand Fir, >3m
>5	Baldhip Rose	Arbutus in plot, along with 3 Oaks.
>5	Ocean Spray	Cotton Wood on edge of Dogwood concentration
>5	Indian Plum	Cascara in corner of plot
>5	Sword Fern	
>1	Red Honeysuckle	
>5	Holly	
1 to 3	Trailing Blackberry	
3 to 5	Snowberry	
>1	Solomans (plot 9 Uknown A:)	

- >1 English Ivy
- 5 Black Hawthorn
- >1 False Lily-of-the-Valley

Plot 11: Garry Oak (Central Bit): 10m Plot: Oct 4th

% cover	Species	Notes
		Bird: Yellow strip on top of head
1	Black Berry (Himalayan)	
>1	Trailing Blackberry	Maybe too edgy?: Although in center 1/2 is quite close to trail & showing ++ edge effects
10 to 15	Indian Plum	
10 to 15	Hawthorn	
70 to 80	Snowberry	
>1	Daphne	
1	Baldhip Rose	

Plot 12: Garry Oak (Open Meadow): 10m Plot: Oct 4th

% cover	Species	Notes
60 to 70	Indian Plum	
30 to 40	Snowberry	
15 to 20	Rock	
10 to 15	Open Soil	
>1	Licorice Fern (In moss on rock)	
>1	Baldhip Rose	
>5	English Ivy	
>1	Unknown A: No idea	
1	Unknown B: Hollow, ridgy stems >1m, is branching. Only in open soil.	

Plot 13: Garry Oak (by meadows but in conifers): 10m Plot: Oct 4th

% cover	Species	Notes
80	English Ivy	Ivy Desert.
>3	Trailing Blackberry	
25 to 50	Indian Plum	
25 to 30	Snowberry	
10 to 15	Holly	
>1	Daphne	
>1	Bracken Fern	
>1	Unknown A: Buttercup sp.?	
3 to 5	Unknown B: Pacific Ninebark	

Plot 14: Mystic Vale: 10m Plot: Oct 5th

% cover	Species	Notes
90 to 100	English Ivy	Snow fence slope plot
15 to 20	Sword Fern	East facing Muddy in depressions under Ivy
15 to 20	Elderberry	
10 to 15	Indian Plum	Ivy everywhere.
1	Holly	Lots of spiders
3	Scouring-Rush	
3 to 5	Lady Fern	
5	Skunk Cabbage	
>1	Thimbleberry	
10 to 15	Kneeling Angelica	
>1	Mexican Hedge Nettle	
1	Stinging Nettle	
1	Large Leaved Aven	
>1	Common Horsetail	
>1	Himalayan Blackberry	
3	Snowberry	
15 to 20	Unknown A: Vine (escaped horticulture?)	

Plot 15: Mystic Vale: 10m Plot: Oct 5th

% cover	Species	Notes
85 to 90	English Ivy	Snow fence riparian plot.
25 to 30	Lady Fern	Creek: Clear & flowing.
15 to 25	Skunk Cabbage	Water Seepage non-pt source water.
1	Snowberry	
3 to 5	Salmonberry	
3 to 5	Elder Berry	
5	Sword Fern	
>3	Scouring-Rush	
>3	False Lily-of-the-Valley	
>1	Large Leaved Avens	
>1	Holly	
>1	Licorice Fern	
>1	Indian Plum	
1	Ocean Spray	
>1	Kneeling Angelica	

>1 ** that little plant from plot #1

Plot 16: MV: Lower Sword, E. Slope: 10m Plot: Oct 5th

% cover	Species	Notes
85 to 90	Sword Fern	Exposed ground btw Ferns.
>1	Holly	2:15 to 3:15 Dog stats :1(on) 7(off)
>1	Indian Plum	Past marker w/ fence ~20m on "L"
>1	Huckleberry	Across from big pt w/ broken snag.
1	Snowberry	Squirrel
>1	Trailing Huckle Berry	Heard a Wood Pecker
>1	English Ivy	
1	Dull Oregon Gal	
>1	Grass	
5 to 10	Exposed Soil	
>1	Purple Pea Vine	
>1	Unknown A: Solomans Seal? *(spp? Sample w/ roots)	
>1	Unknown B: No idea.	

Plot 17: MV: Mid Slope, E.Slope: 10m Plot: Oct 5th

% cover	Species	Notes
25 to 30	Trailing Huckleberry	Stand on the little bridge, sight 300 degrees & ~20m up slope is quadrant.
25 to 30	Salal	But: Hike up loge to get there, Steep & Prickly
25 to 30	Dull Oregon Grape	Lots of spiders
>3	English Ivy (growing up snag)	Ocean Spray nearby.
5 to 10	Bracken Fern	Dominant is a solid mix of top 3 w/ a sub-dominant
15 to 20	Sword Fern	
5	Cascara	
5	Holly	
5	Thimbleberry	
1 to 3	Grass	
>1	Solomans Seal (w/red berries)	
5	Huckleberry	
3 to 5	Vanilla Leaf	
1	Pathfinder	
>1	Cleaver	
>1	Licorice Fern	
>1	Snowberry	
>5	Moss	

Plot 18: MV: Maple sub-canopy, E. Slope: 10m Plot: Oct

6th

% cover	Species	Notes
95 to 100	English Ivy	With back to log 360 degrees ~20m up E.Slope (around corner is snow fence)
5 to 10	Salal	
>5	Trailing Huckleberry	Maple sub-canopy area characterized by Ocean Spray & Salal w/ conifer overstory
10 to 15	Ocean Spray	
>5	Sword Fern	3:45 owls started calling.
>3	Holly	
>1	Baby hawthorn (sp?)	
3 to 5	Dull Oregon Grape	
>1	Indian Plum	
>1	Daphne	
>3	Unknown A: Ornamental?	

Plot 19: MV: Maple canopy, E. Slope: 10 m Plot: Oct 6th

% cover	Species	Notes
30 to 40	Dull Oregon grape	Upstream from Plot 18 w/ wide, empty stream channel
30 to 40	Sword Fern	
25	English Ivy	Lots of small/taller Maples.
>5	Huckle Berry	Less conifers
>1	Cherry	Lots of Sword fern and Oregon grape w/ Ivy inbetween
>1	Trailing Blackberry	
>3	Holly	
>1	Solomans Seal (sp?)	
>3	Indian Plum	
10	Moss	
>1	Bracken Fern	
>1	Snowberry	
>1	Daphne	
>1	Broad Leaved Star	
>1	Flower	
>1	Unknown A: Baneberry?	

Plot 20: MV: Upper shrubs, E. Slope: 10m Plot: Oct 6th

% cover	Species	Notes
30 to 40	Dull Oregon Grape	
5	Holly	
10 to 15	Sword Fern	

- 5 to 10 Snowberry
- 10 to 15 Trailing Blackberry
- 5 English Ivy
- >5 Huckleberry
- >3 Pathfinder
- >3 Honeysuckle

Plot 21: MV: Sword Fern, W. Slope: 10m Plot: Oct 6th

% cover	Species	Notes
80 to 90	Ivy	Directly across from Maple stand
15 to 25	Sword Fern	just past bridge/ big fallen log
15 to 20	Indian Plum	
>10	Ocean Spray	
>5	Snowberry	
>3	Holly	
>1	Solomon Seal	
>1	Trailing Blackberry	
>3	Huckleberry	
>1	Vanilla Leaf	
>3	Salal	
>3	Elderberry	

Plot 22: MV: Steeper Sword Fern: 10m Plot: Oct 6th

% cover	Species	Notes
95 to 100	Ivy	Across from plot 18 look for the fallen log
15 to 25	Sword Fern	at top of big Ivy log
>10	Indian Plum	
>5	Holly	
>1	Dull Oregon Grape	
>1	Trailing Blackberry	

Plot 23: MV: Healthy rip area, E.Slope: 10m Plot: Oct 11th

% cover	Species	Notes
40 to 50	Ivy	Just up from snow fencing
10 to 15	Sword Fern	Next to big old rotten maple nurse stump
5 to 10	Trailing Blackberry	Alders nearby
10 to 15	Snowberry	Non-pt seepage, very wet

>5	Thimbleberry	Trail far from creek
50 to 60	Indian Plum	CWD
15 to 20	Elderberry	Water content topography changes.
>3	Himalayan Blackberry	Very Dense.
>1	Grass	
>5	Skunk Cabbage	
5 to 10	Salmonberry	
>3	False Lily-of-the-Valley	
>5	Lady Fern	
>3	Holly	
>3	Laurel	

Plot 24: MV: Ivy/Plum, W. Slope: 10m Plot: Oct 12th

% cover	Species	Notes
90 to 95	Ivy	Up from green culvert.
50 to 60	Indian Plum	Not far downstream from stairs. More herbs @ top near University Cedar
15 to 25	Sword Fern	Hill Corner : sun?
15 to 20	Snowberry	
>5	Trailing Blackberry	
>1	Vanilla Leaf	
>3	Dull Oregon Grape	
3	Red Huckleberry	
>1	Holly	
	Broad Leaved Star	
>1	Flower	
>1	Wall Lettuce	

Plot 25: MV: Ivy/Plum, W. Slope: 10m Plot: Oct 12th

% cover	Species	Notes
80 to 90	Ivy	
30 to 40	Indian Plum	
25 to 30	Ocean Spray	
5 to 10	Sword Fern	
>3	Bracken Fern	
5	Red Huckleberry	
5 to 10	Holly	
>1	Clasping Twisted Stalk	
>3	Trailing Blackberry	
5 to 10	Snowberry	
>3	Dull Oregon Grape	
>3	Vanilla Leaf	

- >5 Salal
- >1 Baldhip Rose
- >1 Unknown A: Cleaver?
- >1 Unknown B: Branched. >1m tall, a bit woody

Plot 26: MV Shrubby ridge, W. Slope: 10m Plot: Oct 12th

% cover	Species	Notes
75 to 80	Ivy	Down from the "Fancy House".
15 to 20	Dull Oregon Grape	Kind of in a gully.
5 to 10	Indian Plum	Pileated Wood Pecker in plot
3	Ocean Spray	
>1	Daphne	
>5	Red Honeysuckle	
>3	Wall Lettuce	
>3	Salal	
>3	Snowberry	
	Broad Leaved Star	
>1	Flower	
>3	Trailing Huckleberry	
>3	Baldhip Rose	
>1	Grass	
>3	Holly	
5 to 10	Exposed Soil	

Plot 27: * As inserted above inbetween plots 8 and 9

% cover	Species	Notes
40 to 50	Salal	Across from root wall. Huckleberry 1/2 m ² . (along coverage walk)
30 to 40	Ocean Spray	
10	Snowberry	
10	Holly	
>1	Bracken Fern	
3	Sword Fern	
5 to 10	Trailing Blackberry	
>1	Red Honeysuckle	
10	Cascara	
10	Baldhip Rose	
3	English Ivy	
>1	Licorice Fern*	
>1	Thimble Berry	
3	Dull Oregon Grape	
1	Grass	

- 10 Cherry
- >1 Pea (Purple Pea Vine)
- >1 Unknown A: Vine (Whipple Vine)

Plot 28: MV: Top edge, E. Slope: 10m Plot

% cover	Species	Notes
80 to 90	Snowberry	Between Path and Ravine.
20	Ocean Spray	Almost Entirely Snowberry just before bench Yellow flagging
20	Indian Plum	tape.
10 to 15	Trailing Blackberry	Also Vanilla leaf.
5	English Ivy	
5	Salal	
5	Dull Oregon Grape	
3	Holly	
>1	Sword Fern	
1	Bracken Fern	

Plot 29: MV: Top Edge, E. Slope: 10m Plot

% cover	Species	Notes
95	English Ivy	Between parking lot and path.
30 to 40	Snowberry	
5	Elderberry	
10	Ocean Spray	
10	Holly	
15 to 20	Dull Oregon Grape	
>1	Bracken Fern	
>1	Pathfinder	
>1	Laurel	
>1	Honeysuckle	
3	Trailing Blackberry	
3	Sword Fern	
3	Baldhip Rose	
>1	Wall Lettuce	

Plot 29: MV: Ravine top compacted: 10m plot: Oct 25th

% cover	Species	Notes
20	Sword Fern	Hard packed flood plain.
10 to	Snowberry	Bank erosion.

15
 >3 Holly Biodiversty.
 >1 Indian Plum Dog prints in creek.
 5 English Ivy
 60 Exposed Soil
 20 Creek bed
 >1 Large Leaved Aven
 >1 Moss

Plot 30: MV: Ravine, Flood plain between bridges: 10m Plot: Oct 25th

% cover	Species	Notes
75 to 80	English Ivy	A potential flood plain.
25	Sword Fern	
15 to 20	Snowberry	
15 to 20	exposed Soil	
10	Dull Oregon Grape	
5	Holly	
3	Huckleberry	
>3	Trailing Blackberry	
>1	Solomon Spp	

Plot 31: MV: Ravine, Sword fern across from maple stand: 10m Plot:

% cover	Species	Notes
25	Sword Fern	Sand in river covered in dog prints A dog came and dug a whole in creek bed, while here.
15 to 20	English Ivy	
3 to 5	Indian Plum	
>1	Licorice Fern	
1	Snowberry	
1	Huckleberry	
>1	Large Leaved Aven	
1	Moss	
>1	Nipple Wort	
10	Creek Bed	
75	Exposed Soil	
>1	Unknown A: American Bullrush?	
>1	Unknown B: Violet	

Pseudo Plots:

Garry Oak: Oct 15th: Pseudo Plot: Little Garry Oak area.

% cover	Species	Notes
>5	Scouler's Willow	
25	Snowberry	
25	Himalayan Huckleberry	
3	Trailing Blackberry	
25	Nootka Rose	
>1	Canada Thistle	
20	Dogwood	
20	Hawthorn	
>3	Trailing Blackberry	
3	Cherry	
>1	Dock	
1	Crab Apple	
>1	Grass (canary)	
>1	Daphne	
1	Grass (other)	
>1	Hardhack (bushy flowery stuff)	

Garry Oak: Oct 25th: Pseudo Plot: Little conifer area.

% cover	Species	Notes
20 to 25	Hawthorn	The area by parking lot conifer area.
10 to 20	Dogwood	
>3	Trailing Blackberry	
5	Indian Plum	
15	Nootka Rose	
>1	Bracken Fern	
25 to 30	Snowberry	
>1	Grass	
15 to 20	Himalayan Blackberry	
>1	Trailing Buttercup	

Garry Oak: Oct 25th: Pseudo Plot: Parking lot edge polygon.

% cover	Species	Notes
40	Dogwood	A suprising number of species.
10 to 15	Snowberry	Morning glory growing up stuff on edges.
>1	Bracken Fern	
>1	Pacific Ninebark	
30 to 40	Himalayan Blackberry	
20 to 30	Hawthorn (sp?)	
>1	Daphne	
3	Holly	

- >1 Western Redcedar
- >1 Arbutus
- 10 to 15 English Ivy
- >1 Canada Thistle
- >! Grass
- 1 Willow Sitka
- 1 Trailing Buttercup
- 3 Elderberry
- 3 Pacific Crab Apple
- 10 Morning Glory
- >1 Dock
- >3 Cascara
- 1 Alder

Garry Oak: Oct 25th: pseudo Plot: Main conifer polygon.

% cover	Species	Notes
40	Himalayan Blackberry	Too Prickly/thick to plot.
40	Dogwood	Stood on tree (~5m of the ground) and did a pseudo plot instead.
10	Cherry	
3 to 5	Cascara	
>1	Trailing Blackberry	
3	Holly	
3	English Ivy	
>3	Sword Fern	
>1	Solomons Seal	
>1	Large Leaved Aven	
>3	Trailing Buttercup	
>1	Elderberry	
>3	Snowberry	
>1	Bracken Fern	
>1	Sitka Sedge	
>1	Unknown A: That shrub that isn't Hawthorn.	

Garry oak: Oct 25th: Pseudo Plot: Road edge polygon.

% cover	Species	Notes
40	Nootka Rose	
40	Snowberry	
>1	Grass	
10	Indian Plum	
>1	Trailing Blackberry	
30	Hawthorn	
3	Himalayan Blackberry	
>1	Canada thistle	

>1 Cascara
 >10 Cherry
 10 to 15 Dogwood
 >1 Dock

Mystic Vale: Oct 25th: Pseudo Plot: E. Slope: Ivy desert.

% cover	Species	Notes
95 to	100 English Ivy	
25 to 30	Dull Oregon grape	
10	Holly	
3	Bracken Fern	
5	Trailing Blackberry	
>1	Solomon Sp?	
>1	Pathfinder	
>1	Grass	
20	Snowberry	
3	Vanilla leaf	
15	Ocean Spray	
>5	Sword Fern	
>1	Daphne	
5	Indian Plum	
>1	Himalayan Blackberry	
>1	Salal	

Appendix W –Point Center Quarter Data

1st Quarter				2nd Quarter				3rd Quarter				4th Quarter				
POINT	SPECIES	DISTANCE	DBH	Area	SPECIES	DISTANCE	DBH	Area	SPECIES	DISTANCE	DBH	Area	SPECIES	DISTANCE	DBH	Area
1	ACM	2.09	13.93	143.07	AB	8.20	25.20	539.80	ACM	5.90	11.30	98.47	ACM	3.09	15.00	150.87
2	PM	7.00	11.09	94.99	ACM	16.13	84.20	3442.23	ACM	7.40	32.90	869.68	AB	4.33	21.30	334.75
3	AB	7.24	5.00	19.83	AB	8.30	2.30	4.10	AB	4.40	28.90	103.04	TD	3.91	3.10	7.54
4	AB	6.07	16.08	248.67	AB	5.70	23.70	578.48	ACM	3.17	7.68	48.34	AB	3.30	27.00	893.66
5	ACM	7.09	3.50	9.02	ACM	4.80	9.20	8.84	ACM	5.40	12.30	130.03	ACM	3.30	8.40	55.28
6	ACM	6.33	22.48	493.08	ACM	3.70	6.80	24.81	NA	4.80	15.30	78.60	ACM	6.24	16.10	234.70
7	TD	1.88	6.00	28.20	WT	5.30	15.40	186.17	AD	0.95	17.80	245.72	ACM	3.27	27.00	893.66
8	AB	2.49	9.70	73.86	AB	6.10	8.30	54.72	PM	3.20	19.00	79.80	WT	3.96	22.90	411.66
9	WT	3.13	16.68	162.81	AM	1.80	5.80	19.17	AB	5.49	22.80	379.84	AB	6.11	8.90	87.27
10	PM	4.00	41.00	1319.99	ACM	12.59	83.00	3119.07	PM	6.40	83.90	3119.87	PM	6.59	49.00	1864.79
11	WT	4.44	30.00	7862.60	AB	3.32	18.00	4775.94	ACM	3.30	45.30	1889.44	PM	5.52	82.00	3275.28
12	PM	6.91	113.80	18323.07	AD	1.80	43.00	1405.27	ACM	4.20	23.90	415.07	ACM	4.34	15.00	132.87
13	ACM	8.52	75.00	179.64	ACM	8.30	22.00	379.84	AB	8.62	38.30	1817.36	ACM	10.54	70.00	86.93
14	ACM	11.78	90.00	289.06	ACM	2.52	23.00	495.27	AD	9.27	67.90	2950.47	ACM	7.23	23.00	419.27
15	PM	3.68	88.00	2460.74	PM	6.78	38.00	4775.94	AB	4.90	68.00	3828.84	AB	2.34	40.00	1599.08
16	ACM	4.18	55.00	132.07	ACM	4.80	14.00	153.80	ACM	2.76	17.30	225.67	ACM	2.72	14.00	153.80
17	ACM	11.91	33.00	866.67	ACM	3.86	81.00	1384.74	ACM	3.11	11.30	94.89	ACM	12.40	79.00	283.28
18	ACM	7.17	11.00	94.89	AB	5.36	28.00	815.44	ACM	2.89	18.30	78.50	AM	16.35	17.00	228.87
19	ACM	13.67	103.00	78.90	AB	6.47	24.00	687.89	ACM	2.89	34.30	687.88	ACM	6.98	18.00	133.86
20	ACM	7.08	36.00	1193.84	AD	2.27	6.40	32.18	ACM	6.85	43.30	1451.47	ACM	3.48	35.00	1133.04
21	PM	0.93	96.80	7962.79	ACM	5.70	14.00	380.80	ACM	4.80	17.30	225.67	ACM	5.93	20.00	232.72
22	ACM	4.28	16.18	263.48	AB	9.70	73.00	4163.27	AD	6.90	66.90	3416.46	AB	9.28	25.00	822.93

POINT	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
1st Quarter	SPECIES	ACM	PM	AB	AD	ACM	ACM	TD	AB	WT	PM	WT	PM	ACM	ACM	PM	ACM	ACM	ACM	ACM	PM	ACM	ACM
	DISTANCE	2.00	7.00	7.24	6.81	7.00	9.30	7.98	2.84	3.73	4.68	4.48	6.91	5.52	7.70	3.89	6.78	1.21	7.17	9.97	3.86	13.28	4.28
	DBH	11.30	11.30	5.00	30.58	3.50	22.08	8.30	19.85	41.30	50.80	8.30	113.00	10.00	10.00	58.08	10.00	33.80	11.30	13.08	30.00	36.30	18.10
	Area	143.87	94.99	79.63	268.87	8.82	490.86	28.28	73.86	162.81	1319.99	1842.90	19323.07	176.84	208.86	2469.74	102.87	864.87	94.89	78.98	1133.04	7462.79	223.48
2nd Quarter	SPECIES	AD	ACM	AB	AD	ACM	ACM	WT	AD	PM	ACM	AB	ACM	ACM	PM	ACM	ACM	AD	AD	AD	AD	ACM	AB
	DISTANCE	5.20	18.50	8.30	5.70	4.40	3.70	8.30	6.70	1.48	12.80	3.32	1.88	5.50	2.82	6.76	4.80	3.89	6.47	2.27	5.18	6.78	
	DBH	20.28	58.20	2.30	25.78	3.20	8.30	15.48	6.80	3.69	63.80	78.80	43.80	22.00	33.00	75.00	14.00	42.80	28.90	14.08	6.40	10.80	73.80
	Area	338.86	1040.22	6.15	818.88	8.40	24.81	184.17	66.72	18.17	6775.84	4775.84	1431.47	378.84	675.27	4775.84	103.86	1384.74	610.44	987.48	22.15	200.96	4183.27
3rd Quarter	SPECIES	ACM	ACM	AB	ACM	ACM	NA	PM	AB	PM	ACM	ACM	ACM	AB	AD	ACM	ACM	ACM	ACM	ACM	ACM	ACM	AB
	DISTANCE	5.90	7.00	4.46	3.17	6.40	4.80	1.39	3.38	5.49	6.48	3.58	4.28	6.62	8.27	4.80	2.78	3.11	2.69	2.89	6.87	4.08	15.89
	DBH	11.28	32.90	26.00	7.90	12.80	18.08	17.88	6.80	22.30	64.80	46.80	22.80	36.00	87.08	68.08	11.88	11.88	18.08	34.08	40.00	17.80	64.80
	Area	303.47	1443.08	530.66	40.34	130.03	78.58	248.72	30.58	370.54	3119.87	1598.83	415.27	1077.38	2590.47	3029.84	228.87	94.89	78.90	1077.46	1411.47	225.67	7478.46
4th Quarter	SPECIES	ACM	AB	PM	ACM	ACM	ACM	WT	AD	PM	PM	ACM	ACM	ACM	ACM	AB	ACM	ACM	ACM	ACM	ACM	ACM	ACM
	DISTANCE	3.00	9.75	3.91	5.30	3.30	4.24	3.27	3.95	5.11	6.08	5.52	4.34	10.04	7.25	2.34	2.72	12.40	18.30	4.30	1.40	9.30	9.23
	DBH	102.08	21.30	3.10	27.58	8.40	14.15	27.58	22.68	6.68	49.30	80.80	13.80	70.68	22.00	83.08	44.08	19.80	17.80	14.08	36.08	20.40	26.80
	Area	102.87	7.54	303.85	55.38	234.75	303.85	411.80	37.37	1804.70	5276.34	132.67	80.95	418.27	1258.08	951.80	283.28	220.87	153.80	1133.04	333.12	1622.93	

17	ACM	1.00	1.00		1.80	1.80	1.80	1					1.08	1.00	1.80		1.80	1.00	1.00	1.80	1.00	1.00	1.80
18	AB	1.00	1.00	1	1.80				1.80	1.08		1	1.08	1.00	1.80	1.80	1.80	1.00	1.00	1.80	1.00	1.00	1.80
19	PM		1.00																				
20	WT			1																			
21	PM					1.80																	
22	ACM										1.08	1.08	1	1.08									
23	PM													1.08									
24	ACM															1.80							