Improving Ecological Function of a Stream and Wetland site at Swan Lake Christmas Hill Nature Sanctuary

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Abstract

The Lochside trestle site is an urban 2-hectare mixed wetland site in Saanich, BC, under Swan Lake Christmas Hill Nature Sanctuary (SLCHNS) management, however in recent years it has received little attention. The site was characterized using the essential ecosystem characteristics framework (Harwell et al. 1999), and existing plant communities described qualitatively. Previous studies about this site contextualize observations and inform recommendations. This site has a variety of native plant species present (predominantly broadleaf trees and shrubs), demonstrating potential for regeneration, but is severely limited by the ditch-like nature of Blenkinsop Creek and high invasive species presence. Blenkinsop Creek is highly reactive to stormwater and is entrenched, making adjacent floodplain access difficult. Notably, the invasive species Lesser celandine (*Ficaria verna*) was observed, the first sighting at SLCHNS. The relative integrity of Leeds Creek (on-site tributary to Blenkinsop Creek) 23 years after construction demonstrates the potential for further successful stream and wetland construction on this site. The return of stream and wetland ecological functions, mitigating stormwater surge and filtering nutrients, sediments, and pollutants prior to Blenkinsop Creek entering Swan Lake is desirable and possible for this site. The reconstruction of Blenkinsop Creek as a functional stream with an associated wetland in the field east of the trestle should be prioritized by SLCHNS, seeking collaboration with UVic, City of Saanich, and CRD. In the meantime, selective invasive species control, assisting stand regeneration with plantings, and garbage removal could improve the site's current integrity.

Introduction

The Lochside trestle site is an urban mixed wetland site in Saanich, BC (Figure 1 location map), within Swan Lake Christmas Hill Nature Sanctuary (SLCHNS) management, however the lack of easy access means it receives significantly less attention than other areas. It is fragmented from other ecosystems, surrounded by houses and roads, and has a high presence of invasive plants. It also has varied native wetland broadleaf communities and some conifers. Blenkinsop Creek has been channelized and lacks sinuosity, and is the main stream that enters Swan Lake. Leeds Creek, which emerges from a culvert on this site to feed into Blenkinsop Creek, was constructed on this site in 1998 (Edmonds 2002) and is in much better condition. The Lochside trestle site has high potential to mitigate the effect of stormwater and better filter nutrients, pollutants and sediments before they reach Swan Lake (Edmonds 2002; Buchanan et

al. 2009; Townsend 2009; 2010), although it currently simply acts as a direct conduit. This paper seeks to build on previous studies on this site, provide a much-needed update to its current condition, and provide recommendations to approach improving the functionality of this wetland area as a critical part of restoration at SLCHNS.

Figure 1. Site location in relation to Swan Lake and SLCHNS

Methods

For this project, I made observations during three site visits and one visit to a reference site (from March 2 to April 1, 2021) selected based on suggestions from Dr. Richard Hebda (Gabo Creek, at the northeast edge of Rithet's Bog). I used the essential ecosystem characteristics framework (Harwell et al., 1999) to characterize both sites, along with descriptions of observed plant communities and species lists. A site visit with SLCHNS Site Manager Jay Rastogi (March 16, 2021) informed me of goals that SLCHNS has for this site. Wetland plant community characterization was attempted using "Wetlands of British Columbia: A Guide to Identification" (MacKenzie and Moran 2004), however the highly altered and degraded state of this wetland and my own lack of technical ability to undertake detailed soil and hydrology analysis led this to be largely unfruitful. Plant identification was based on plant

descriptions in Plants of Coastal British Columbia (Pojar & MacKinnon 2004) and the iNaturalist plant database. I also referred to technical research related to this site accessed via the University of Victoria Library (i.e. Edmonds 2002; Buchanan et al. 2009; Townsend 2009; 2010).

Results

The site is on a substrate of marine clay (Townsend 2009; 2010) and presents a mosaic of different wetland plant communities with many native species present, although they are predominantly one age class. Seven main plant communities were distinguished, and most seem fairly vigorous (see Figure 1 and Table 1). It is separated from the main SLCHNS site by Saanich Road, surrounded almost entirely by houses and roads, except one small section that extends briefly between buildings on the east side. Observed animal use of this site includes deer (browsing and antler rubbing), racoons (tracks seen), and birds (foraging, mud probing, and nesting). Most areas lack significant large woody debris, although Leeds Creek and the adjacent wetlands contain a significant amount. Petrochemicals and other pollutants were noted, and garbage was abundant. The water is assumed to be nutrient-rich and polluted due to agriculture runoff and the urban environment. The streams are extremely reactive to rainfall (Rastogi, SLCHNS Site Manager, Personal Communication, 2021), receiving a large amount of stormwater from impervious areas in the urban environment.

Figure 2: Map of Plant Communities and Waterways

Invasive species are abundant, especially English ivy (*Helix hedera)* which dominates many areas. Notably, two established communities and some dispersed individuals of Lesser celandine were found, the first sighting at SLCHNS (see Appendix B, map of known locations). There is a community of Fawn lilies (*Erythronium oregonum*), a valued and delicate species, in the NE corner of the site, where SLCHNS and volunteers removed English ivy about six years ago (Rastogi, SLCHNS Site Manager, Personal Communication, 2021), which is currently being overtaken by English ivy again.

The reference site contains Gabo Creek and the surrounding plant community where it enters Rithet's Bog from the northeast, in a transition zone between the Douglas-fir-dominated community upstream and the bog ecosystems downstream. It is directly downstream of an engineered pool and waterfall, where the creek becomes braided, entering a plant community of Red alder (*Alnus rubra*), Black hawthorn (*Crataegus douglasii*), and Skunk cabbage (*Lysichiton americanum).* The reference site's section of creek has good sinuosity and complexity, and the plant community shows moderate stand regeneration, a diversity of appropriate native species and some invasive plants (see tables 2 and 3 for plant community description, essential ecosystem characteristics).

Site Hydrology

Blenkinsop Creek is ditch-like, lacking sinuosity and adequate bank stabilizing species with vertical or near-vertical banks. This stream was historically much smaller, channelized to drain the wetlands surrounding Blenkinsop Lake around the late 1800s or early 1900s (Buchanan et al. 2009). It was deemed non-functional based on Proper Functioning Condition standards (Buchanan et al. 2009), appearing similarly today. Erosion is seen in multiple areas, for example sloughing, and a severely undercut bank where the stream has eroded underneath a stabilizing shrub. The clay substrate slows the effects of erosion (Buchanan et al. 2009). The stream contains minimal large woody debris, although in three instances garbage (e.g. milk crates, furniture) formed complexes functioning similarly to large wood. The entrenchment of the creek means that the surrounding floodplain is difficult to access, however due to reactivity to storms this likely still occurs relatively frequently. Buchanan et al. (2009) project this stream as a potential Rosgen channel-type C6, which it appears to be working towards through eroding banks and mild increases in sinuosity.

Leeds Creek, emerging from a culvert at the SE corner of the site, is in significantly better condition than Blenkinsop Creek. It is quite sinuous, with banks largely vegetated with Slough sedge (*Carex obnupta*) and riparian shrubs and trees such as Willows (*Salix spp.*). The surrounding floodplain is more easily accessible than for Blenkinsop Creek, looking similar to the reference site (see Tables 3 & 4 for reference site details). In multiple locations, windthrown trees have altered the stream's path, and the point bars created by these events are revegetating, a positive indicator of stream function (Buchanan et al. 2009). It also has a

significant amount of large wood crossing the stream and providing bank armouring. This creek and adjacent wetland areas were constructed and planted in 1998 to address the former ditch-like character of this creek which is otherwise entirely underground stormwater drainage (Edmonds 2002).

Goals and human use

From the perspective of SLCHNS, the main goal for this site would be to restore the ecological function of the streams and wetlands to retain water and filter nutrients, sediments, and pollutants before reaching Swan Lake (Rastogi, SLCHNS Site Manager, Personal Communication, 2021).

Discussion

This site has a variety of native species communities with potential for further regeneration, currently limited by two main filters: the ditching of Blenkinsop Creek and invasive species presence. The relative integrity of the Leeds Creek area 23 years post-construction suggests that some of the challenges faced by other areas of this site could be mitigated by improvement of Blenkinsop Creek. This would also allow this area to fulfill the ecological function of trapping nutrients, sediment, and pollutants prior to entering Swan Lake, and buffering stormwater flow, the main goal SLCHNS has for this site. Invasive species currently dominate many areas on the site, another significant filter, likely partly stemming from disturbance from agriculture and the channelization of Blenkinsop Creek.

Strengths of this site assessment include detailed mapping of the site; Buchanan et al. (2009) and Townsend (2010) discuss this site in much broader terms, and Edmonds (2002) focuses on the Leeds Creek area. This revealed recently established communities of Lesser celandine (*Ficaria verna*), an invasive species that should be addressed before it makes its way into the main SLCHNS site. Integrating the knowledge from previous studies into this report provides a more comprehensive understanding of the site and previous restoration work completed which has been lost over time at SLCHNS.

A significant weakness is that this project lacked rigour in observation and analysis. Additionally, the time of year and short duration of the project meant that some plant species were likely missed. Future work on this site should include more rigorous methods to describe site characteristics and condition, including plant species distribution and coarse wood litter estimates, water quality testing, measuring reactivity to stormwater, etc. A more appropriate reference site should be determined, based on plant community mosaic (instead of just one) and Rosgen stream classification. A prescription for reconstructing Blenkinsop Creek will require professional expertise and rigorous site analysis to determine ecosystem baselines and develop an appropriate plan.

Recommendations

I recommend that reconstructing Blenkinsop Creek as a functional stream (Buchanan et al. 2009 suggest a Rosgen C6 stream-type) and the development of a functioning wetland in the field east of the trestle are prioritized. This was listed as high priority in the Swan Lake Management Plan 11 years ago (Townsend 2010) but has not yet been done. It would also be beneficial to reconstruct the two culvert entrances on the southwest and northwest sides. Townsend (2009) recommends the use of a weir to direct low flow into the wetland to filter water and to capture the 'first flush' of rainfall after a dry period while allowing direct access to the channel in high flow to avoid overwhelming the wetland. The construction of the wetland would assist with Reed canary grass (*Phalaris arundinacea*) control, using the method seen to be successful around Leeds Creek (Edmonds 2002) and further trialled at Swan Lake (Townsend 2009), using a combination of mulching and densely planted willow stakes. In some areas, a one-year period of benthic smothering with pond liner followed by planting through a cardboard and decomposed leaf compost sheet mulch could be considered to incorporate open wetland plant species (e.g. native grasses, flowering annuals) into the project (Kristen Miskelly, co-owner of Saanich Native Plants, Personal communication, May 2021). In reconstructing the stream, using large wood from off-site would be ideal; this proved to be highly effective in promoting the stability of Leeds Creek (Edmonds 2002). A potential collaboration between SLCHNS, University of Victoria, the City of Saanich, and the Central Regional District (as in the Leeds Creek project) should be explored, as this would be a costly, legally complex, technical, and labour-intensive undertaking.

Figure 3. Potential course of Blenkinsop Creek, culvert flows, and associated wetland

In the meantime, focus could be directed in other areas: invasive species control, garbage removal, and supporting stand regeneration (see table 4 for detailed recommendations). Targeting novel invasive species such as Lesser celandine should be prioritized, along with selective control of English ivy which is climbing up trees and overtaking the Fawn lilies. If there is a sufficient concentration of Black hawthorns in the central area, English hawthorns (*Crataegus monogyna*) could be girdled to create standing deadwood and create space for younger native shrubs. The integrity of the Leeds Creek area could be improved by planting shrubs to assist stand regeneration, as well as increasing the population of appropriate herbaceous layer species such as Skunk cabbage and sedges.

Ultimately, this site has diverse native plant communities currently hindered by the channelization of Blenkinsop Creek and high presence of invasive species. This site has potential to become a functional wetland area, buffering the impacts of stormwater surge and urban runoff on Swan Lake by dispersing and retaining water, and filtering nutrients, sediments, and pollutants. The development of a plan to turn Blenkinsop Creek into a functional C6 stream that goes through a constructed wetland in the field east of the trestle should be prioritized. While this extensive project is underway, invasive species control, garbage removal, and planting native shrubs to support stand regeneration could be undertaken.

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Table 1: Observed Plant Communities at Lochside Trestle site

Plant Community	**Species**	**Coarse woody debris**	**Comments**
Black cottonwood / Red alder / Slough sedge	Canopy: Black cottonwood (*Populus balsamifera ssp. trichocarpa*) and Red alder (*Alnus rubra*), occasional Douglas fir (*Pseudotsuga menziesii*) Shrub layer: Red osier dogwood (*Cornus stolonifera*), Willow species, Black twinberry (*Lonicera involucrata*), Western red cedar (*Thuja plicata*), Douglas fir Herbaceous layer: Slough sedge, Scouring rush (*Equisetum hyemale),* another Horsetail species (*Equisetum spp.*), Reed canary grass, Moss (*Bryophyta*)	Significant, especially in thickets.	Below the trees, there is little shrub development, potentially due to the close planting of trees, and in some areas shrubs dominate in dense thickets with little groundcover development. Decomposing leaves and woody debris are present on the ground. The stands seem to all be of one age class, with little regeneration occurring. On the edges close to the road and houses, Himalayan blackberry and exotic tree species dominate.
Reed canary grass marsh	Herbaceous layer: Reed canary grass	None	On April 1, the thick peat layer in the root mass was hydric, with groundwater within 10cm of the surface. This monotypic community floods with standing water in the winter (Rastogi, Personal Communication), drying out over the course of the summer. This plant

			community falls within the Reed canary grass marsh category in MacKenzie and Moran (2004).
Black hawthorn / English hawthorn	Tree layer: some small Douglas fir stands interspersed Shrub layer: Black hawthorn and English hawthorn dominate, with some Red osier dogwood and ornamental cherry (*Prunus sp.)* present. A number of shrubs are being smothered by English ivy Herbaceous layer: Dominated by English ivy and bare soil. Also present is Himalayan blackberry (*Rubus armeniacus*) thickets, some areas with Scouring rush, and two areas with Lesser celandine.	Minimal	Due to the time of year, it was difficult to distinguish between Black and English hawthorns, thus I do not have an estimate of their ratio. A significant amount of garbage was present, and it seems some areas have been trampled. In one area, Lesser celandine is covering a 10m by 3m patch along the stream bank, which is concerning.
English hawthorn / Reed canary grass / Himalayan blackberry	Tree layer: n/a Shrub layer: small English hawthorns (2-4m tall) Herbaceous layer: Reed canary grass, agronomic grasses, Creeping buttercup (*Ranunculus repens*), Himalayan blackberry (small)	Not present	The ground here is moderately moist, but far drier than other areas, potentially explaining the stunted nature of the hawthorns. Garbage and petrochemical sheen on standing water was noted in this area. The presence of channels on the ground, appearing to be due to erosion, likely indicates this area is prone to submersion, and/or heavy surface flow in

			the winter, draining south to the creek.
Bigleaf maple / Garry oak	Tree layer: Bigleaf maple (*Acer macrophyllum*), Garry oak (*Quercus garryana*) , Douglas fir Shrub layer: Dull oregon grape (*Mahonia nervosa*), June plum (*Oemleria cerasiformis*), Ocean spray (*Holodiscus discolor*), Common snowberry (*Symphoricarpus albus*), Pacific ninebark (*Physocarpus capitatus*), Western red cedar, Daphne (*Daphne laureola*), Bracken fern (*Pteridium aquilinum*) Herbaceous layer: Fawn lily, Licorice fern (*Polypodium glycyrrhiza*), English ivy, Scouring rush, Moss	Moderate	This mixed plant community appears to mostly fit within the description of Douglas fir/Dull Oregon grape ecological community, however also has aspects of a Garry oak ecosystem and wetland ecosystem with Horsetails. It is found along the slope on the eastern edge of the site, and this community continues east beyond the site bounds, up a slope between residential properties where it becomes more distinctly Douglas fir/Dull Oregon grape. A relatively abundant community of Fawn lily is present, competing with English ivy in an approximately 5m by 15m area, which was cleared of English ivy six or seven years ago by SLCHNS.
Conifer	Tree layer: Douglas fir, Spruce species (*Picea sp.*), non-native trees (e.g. Ornamental cherry, Poplar/*Populus sp.*) Shrub layer: Himalayan blackberry, Daphne, English hawthorn	Hard to tell due to Himalayan blackberry thickets	These areas are on slopes at the edges of the site. These seem to be highly degraded and invaded by non-native species introduced by the surrounding urban environment. They have some conifers and non-native trees growing, and large thickets of Himalayan blackberry. The presence of Douglas fir and Sword ferns indicate potential for these

	Herbaceous layer: Sword fern (*Polystichum munitum*), English ivy, bare soil		to represent a Douglas fir/Dull Oregon grape community along the edges of the site, as is seen on the eastern edge. This would also depend on soil type as this may simply be fill from development and construction.
Reed canary grass / Common snowberry / Himalayan blackberry	Shrub layer: Common snowberry, Himalayan blackberry Herbaceous layer: Reed canary grass	Not present	The presence of more vigorous Himalayan blackberry and Common snowberry suggests that this site is somewhat drier and/or less prone to seasonal submersion than the adjacent area with English hawthorns. It is unclear what plant community would be suited to replace this one; this may encompass a few different microclimates between streamside and more upland areas within the existing community.

Table 2: Observed Plant Community of Reference Site (Northeast corner of Rithet's Bog Conservation area, beginning at the pedestrian bridge to 100m downstream of Gabo Creek)

Plant Community	**Species**	**Coarse woody debris**	**Comments**
Red Alder/Black hawthorn/Skunk cabbage	Tree layer: Red alder Shrub layer: Black hawthorn, Red-osier dogwood, Willow species, English hawthorn, Pacific ninebark, Himalayan blackberry Herbaceous layer: Skunk cabbage, Mosses, Fringecup	Significant. In spots strategically piled by managers to slow, divert, and pool water.	Looks most similar to Leeds Creek area of Lochside trestle site. The water flow is slowed significantly due to channel complexity, sinuosity, and large woody debris. See Table 3 for essential ecosystem characteristics.

	(*Tellima grandiflora*), English ivy, Willowherb species (*Epilobium sp.*), Creeping buttercup, Sword fern, Horsetails		

Table 3: Essential Ecosystem Characteristics of Rithet's Bog Reference Site

Essential Ecosystem Characteristic	**Observations**
Habitat quality	This area is relatively small, occupying the edge between transition from Douglas fir/Dull Oregon grape plant community to peat bog, so this represents a small segment of mosaic within Rithet's Bog Conservation Area. This site demonstrates decent structural diversity; tree, shrub, and herbaceous layers seem to be fairly well developed and diverse. Trees and shrubs provide nesting sites, shrubs provide browse, and standing dead wood is present, providing food sources and habitat to insects and birds.
Integrity of the biotic community	There seems to be a good diversity of appropriate native plants present. Skunk cabbage was highly abundant in flooded areas. Invasive species were present, predominantly Himalayan blackberry, English hawthorn, English ivy, and Creeping buttercup. The English ivy was climbing some trees and beginning to fruit.
Ecological processes	Moderate stand regeneration was seen as there was some diversity between shrub and tree age categories. Significant coarse wood litter was present in varying stages of decomposition.
Water quality	Water was seen to be fairly clear. It is assumed to be nutrient rich and containing pollutants due to the urban environment.
Hydrological system	This area receives Gabo Creek via a large pool under the pedestrian bridge. Large woody debris throughout its course assists with pooling and adding complexity to flow. The creek has significant braiding through multiple small channels, which allows for excellent energy dispersal. There is little evidence of excessive erosion.
Disturbance regime	Flooding is likely much more severe and routine due to the relatively high imperviousness of Gabo

	Creek's catchment area. This creek has been disturbed in the past for agriculture and urban development.
Sediment/soil quality	Soil is fully saturated, very soft and mucky with decomposing leaf organic layer on top. Sedimentation in the stream is seen as sand and gravel deposits in streambeds were noted. Erosion seems to match or be less than deposition.

Table 4: Restoration Action Breakdown

Management area/Plant Community	**Priority for Restoration**	**Restoration & Management Actions**	**Knowledge Gaps/Barriers**
Blenkinsop Creek	Highest – main filter for this site and critical function for Swan Lake	Reconfigure Blenkinsop Creek to functional stream form (probably C6 Rosgen, see Buchanan et al. 2009) and direct it through a constructed wetland in the field east of the trestle. Seek collaboration between UVic, City of Saanich, CRD.	A plan must be developed, requiring professional expertise to determine appropriate stream configuration for the landscape. Legal consultation
Black/English hawthorn	Medium-high – the invasive species in this area risk spreading elsewhere that is not yet dominated on the site	Prioritize cutting English ivy that is climbing shrubs, and Lesser celandine that is establishing near confluence with Leeds Creek. Begin removing English ivy, starting at a strategic location with native undergrowth present. Girdling English hawthorns could create space for more native shrubs to proliferate. Remove garbage.	Girdling English hawthorns, an effective strategy to kill them, has been halted due to Saanich's Trees Bylaw.
Black cottonwood/Red alder	Medium	Determine if Willowherb growing in the shrub thickets is Hairy willowherb (exotic invasive) or Fringed willowherb (native). Remove Reed canary grass that remains along the edges of streams and vegetated islands. Remove other	.

		invasive species. Consider planting second round of shrubs (e.g. Red osier dogwood), and herbaceous layer (e.g. Skunk cabbage) as suggested by Edmonds (2002). Could attempt to eliminate the small clearing of Reed canary grass with mulching and live willow stakes (see Townsend 2009).	
Bigleaf maple / Garry oak	High – relatively intact native plant community with Fawn lilies present, invasives not yet dominant	Prioritize removing English ivy from Fawn lilies, progressing outward to remove invasives from there. Remove the few Scotch broom individuals on the eastern slope.	
Reed canary grass	Low	Management of the large field is somewhat dependent on the reconfiguration of Blenkinsop Creek. However, control of the Reed canary grass should begin sooner than the reconfiguration. Consider mulching and live willow stakes (see Townsend 2009), or smothering using pond liner for one year followed by sheet mulch and plantings (K Miskelly, Co-owner Saanich Native Plants, Personal communication, May 2021).	Restoring the hydrology of this area will be important to long-term success in controlling the Reed canary grass. The project will require long-term dedicated resources due to legal processes, consultation, and machinery that will be involved.
Conifer	Medium	Begin removing invasive species in most intact areas, try planting native species such as Sword fern, Dull Oregon grape, or Trailing blackberry to take their place.	

Reed canary grass / English hawthorns	Medium - low	Remove Himalayan blackberry, especially near the eastern edge where this community borders with red-osier dogwood in the Black hawthorn / English hawthorn area. Remove garbage.	Appropriate species to plant in place of the English hawthorns should be determined. Hardhack (*Spiraea douglasii*) or Pacific crab apple (*Malus fusca*) might work well. It may also be worth trying to establish Black hawthorns alongside English hawthorns before girdling them.
Reed canary grass / Common snowberry / Himalayan blackberry	Medium-low: there is little native vegetation present, but removing the Himalayan blackberry before it forms a large thicket would be easier	Remove Himalayan blackberry that is competing with the Common snowberry.	An appropriate plant community for this area should be determined, as it is currently unclear.

Appendices

Appendix A: Species Observed at Lochside Trestle Site

Common Name	**Latin Name**
Agronomic grasses*	
Bigleaf maple	*Acer macrophyllum*
Black cottonwood	*Populus balsamifera ssp. trichocarpa*
Bracken fern	*Pteridium aquilinum*
Cleaver	*Galium aparine*
Common dandelion*	*Taraxacum officinale**
Common snowberry	*Symphoricarpus albus*
Creeping buttercup*	*Ranunculus repens**
Daphne*	*Daphne odora**
Dock*	*Rumex obtusifolius**
Douglas fir	*Pseudotsuga menziesii*
Dull oregon grape	*Mahonia nervosa*
Fawn lily	*Erythronium oregonum*
Fringe cup	*Tellima grandiflora*
Garry oak	*Quercus garryana*
Hardhack	*Spiraea douglasii*
Himalayan blackberry*	*Rubus armeniacus**
Holly*	*Ilex aquifolium*
Horsetail (field or giant)**	*Equisetum arvense or E. telmatiea*
June plum	*Oemleria cerasiformis*
Licorice fern	*Polypodium glycyrrhiza*
Morning glory*	*Convolvulus arvensis**
Nootka rose	*Rosa nutkana*
Oceanspray	*Holodiscus discolor*
Ornamental cherry trees*	*Prunus spp*.*
Pacific ninebark	*Physocarpus capitatus*
Pacific water parsley	*Oenanthe sarmentosa*
Portuguese laurel*	*Prunus lusitanica**
Privet*	*Ligustrum sp.**
Purple foxglove*	*Digitalis purpurea**
Red Alder	*Alnus rubra*
Reed canary grass*	*Phalaris arundinacea**
Salmonberry	*Rubus spectabilis*
Scotch broom	*Cytisus scoparius*
Scouring rush	*Equisetum hyemale*
Skunk cabbage	*Lysichiton americanus*
Slough sedge	*Carex obnupta*
Small-flowered bulrush**	*Scirpus microcarpus***

Spruce species	*Picea sp.*
Sword fern	*Polystichum munitum*
Toadflax*(**)	*Linaria sp.*(**)*
Trailing blackberry	*Rubus ursinus*
Weeping willow*	*Salix babylonica**
Western red cedar	*Thuja plicata*
Willow species	*Salix spp.*
Willowherb species(*?) (**)	*Epilobium sp.*(**)

*Non-native species

**Correct identification uncertain due to observation exclusively in early spring

Appendix B: Map of known Lesser celandine presence