

UBC Social Ecological Economic Development Studies (SEEDS) Sustainability Program

Student Research Report

**Inventory of non-tree plant species along proposed green corridor route on the University of**

**British Columbia campus**

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## **Abstract**

As urbanization rapidly spreads and wild habitats continue to face destruction and degradation, green spaces are becoming an increasingly popular solution to a persistent problem. The ecological “grey zone” created by the University of British Columbia campus separates the ecological zones of Pacific Spirit Park forest and the cliffs over Wreck Beach. To counter this, the UBC SEEDS Sustainability Program would like to implement a green corridor that would connect these areas. In preparation of this, a plant survey was conducted for non-tree species in the area between Agronomy Rd and Thunderbird Blvd, spanning all the way from the forest to the cliffs. This study identifies the various native, exotic, and invasive species that can be found in this area.

## **Introduction**

### *UBC Campus*

Located on the westernmost side of Vancouver, BC, the University of British occupies such a large land area that it exists as its own miniature city. The area consists of the University Endowment Lands, which boast a 1200 hectare land area (The University Endowment Lands Administration, 2014), and the campus itself, which covers 402 hectares (UBC Land Use Plan, 2015). Contained within this area are two ecologically important habitats: the Pacific Spirit Park forest, and the Wreck Beach cliffs area.

The University of British Columbia campus causes a great disconnect between the forest of Pacific Spirit Park and the cliffs that overlook Wreck Beach. The tall buildings, frequent cars, and heavy pedestrian traffic prevent wildlife from travelling through the campus itself, so the only way for most to cross between the two habitats would be to take a wide detour. Aside from causing habitat fragmentation, developing over the original habitat that preceded the University removed valuable plant resources for wildlife in the form of food and shelter. Native plants that once existed are now replaced with ornamental plants that are distributed sparsely through the campus, and do not adequately connect the two sides.

To mitigate this habitat fragmentation and to encourage greater overall biodiversity on UBC lands, the UBC SEEDS Sustainability Program aims to propose a green corridor that will span the length of Agronomy Road, potentially including the area up to Thunderbird Blvd (Fig. 1). The green corridor project is aimed to bridge the gap between two big ecologically important regions on UBC lands, and to reduce the loss of biodiversity suffered from campus development and the removal of the natural areas previously existing there. The green corridor also hopes to re-introduce native plants that encourage wildlife populations through providing food and shelter. To determine the plausibility of the project, UBC SEEDS will conduct an assessment of the proposed area. As part of the assessment, a survey of shrubs and herbaceous plants was conducted for areas of interest in the potential green corridor zone. This was done to make a note of plant species that already occupy the area. Species that are important to the native biodiversity of the area will be taken into consideration during development of the green corridor. As well, this survey identified weedy and invasive species that will require attention before new plants can be put in. Trees were not included in this survey, as a separate tree inventory will be conducted.

## **Methods**

As most of the area along Agronomy Rd is highly developed with buildings, paved roads, and ornamental plant plots, only areas that were deemed “natural” were surveyed. These “natural” areas consisted of plots of land such as parks and other green spaces that contained mainly plants that are commonly found in the Pacific Northwest, instead of decorative plants placed by humans. Sites were chosen this way in the hopes that they would better represent a species composition that would naturally be found in the area. These areas would be more desirable to include in a green corridor as they already contain plants that would be more likely to benefit native wildlife. In total, three areas were identified and surveyed: Totem Park, a small park near a Thunderbird Blvd bus stop, and a section of Pacific Spirit Park classified as “Block F”.

### *Totem Park (TP)*

Totem Park is located far on the west side of campus, just before the cliffs that lead to Wreck Beach, and is surrounded by residence buildings and an operations building. The park is a roughly 0.01 km<sup>2</sup> forested area dominated mostly by conifer trees with some understory shrubs. Conifer needles litter the mostly bare, moderately packed soil (Fig. 1). The tall trees shade most of the park, with few sunny clearings where grass and small forbs can be found. The park does not contain any paths or trails, but is very open and easy to walk through. However, the sidewalk that fringes the park provides a much more direct and accessible route for most pedestrians, so the park is not frequently used as a walking path.



**Figure 1:** Most of the ground at Totem Park consists of packed soil covered in leaf litter, while one clearing contains grasses and small forbs

### *Thunderbird Bus Stop (TBS)*

Bus stop number 59727 is located along Wesbrook Mall, in between Agronomy Rd and Thunderbird Blvd. Next to this bus stop is a roughly 0.01 km<sup>2</sup> green space with fairly frequently used walking paths. The space is bisected by an open section of grass containing a paved walkway and a sitting area (Fig. 1). Surrounded on three sides by houses and apartments, and a busy road on the last side, this survey area is the most isolated from Pacific Spirit Park and Wreck Beach. Tall conifers dominate the area. Dense patches of understory shrubs are more frequent here than in Totem Park, but the area is still relatively open. Conifer needles, leaves, and twigs litter the ground (Fig. 2).



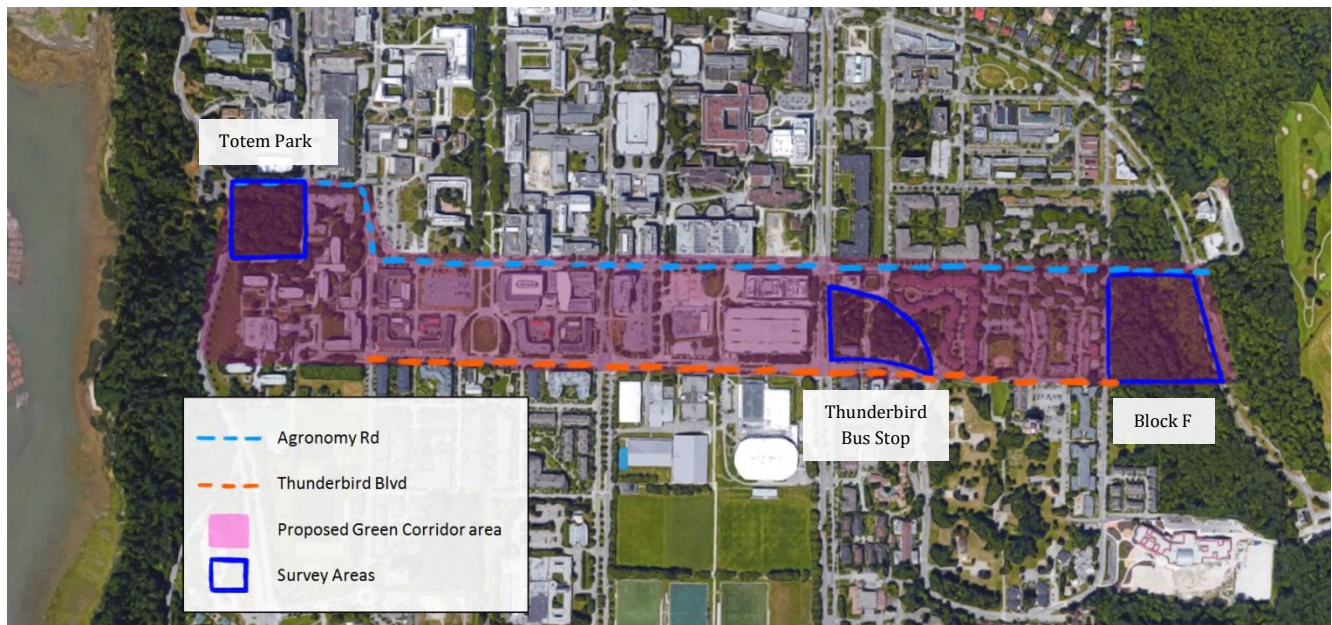
**Figure 2:** Small understory shrubs inhabit the leaf litter covered ground in the area near bus stop 59727 on the University of British Columbia campus

### *Block F (BF)*

Block F is a section of mixed deciduous-coniferous forest just east of the UBC campus within Pacific Spirit Park. Unlike the previous two, this survey area contains many more deciduous trees and shrubs that are densely packed (Fig. 3). Trails cut through the forest, as traversing the dense understory is difficult. This area is detached from the rest of Pacific Spirit Park by University Blvd and Norma Rose Point Elementary School. This 21.44 acre section of forest is distinct because it was transferred by the Province of British Columbia to the Musqueam First Nation (The University Endowment Lands Administration, “Block F Rezoning Application”). As there is currently discussion of rezoning this area by Musqueam Block F Land Ltd, UBC SEEDS has a particular interest in Block F. For this study, only the area within the boundaries of Agronomy Rd and Thunderbird Blvd was surveyed (Fig. 4).



**Figure 3:** Block F is a deciduous/coniferous forest with dense understory



**Figure 4:** Region between Agronomy Rd and Thunderbird Blvd covered by proposed green corridor on the University of British Columbia campus and areas where non-tree plant surveys were conducted

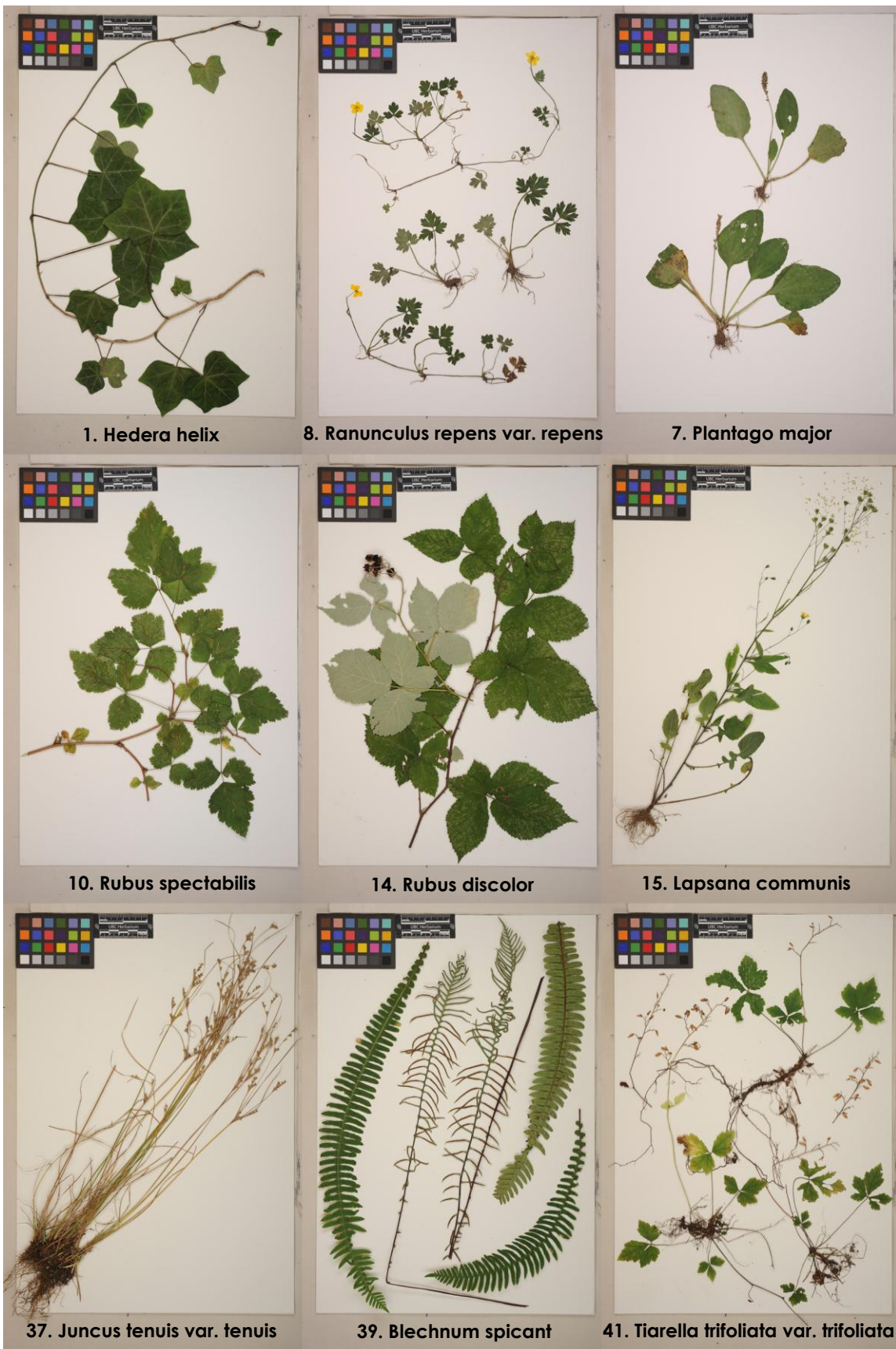
### Survey Methods

Each area was visited once for the duration of time necessary to do a slow walk-through and a quick second check. Most of the time spent at each site was used for taking plant samples and recording collection information. TP and TBS were surveyed for 2 hours each while BF was surveyed in 1 hour. Less time was spent at BF, as samples were only taken for plant species that were not collected in the previous two areas, though occurrences of all species seen were noted. When a unique species was observed, a picture of the plant was taken, and basic collection information was recorded, including GPS location, habitat description, and initial identification. A Garmin eTrex 30 GPS unit was used to obtain all coordinates.

Samples of plants were taken according to specific criteria:

- Ensure that the sample represents a good average of the overall morphology of the plant (eg. not unnaturally small/large leaves, not a branch with an oddly arranged cluster of leaves)
- Take as much material possible to show the structure of the plant, while still allowing the pressed sample to fit inside the plant press
- Take whole leaves that show the shape and margins of the leaf
- Include reproductive structures (flower or fruit) whenever possible
- Include any other features that may aid in the identification of the plant

After an area was surveyed, specimens were pressed between sheets of newspaper, sheets of cardboard, and into a wooden plant press and secured with straps. The plants were left to dry in a dryer at the University of British Columbia Herbarium for up to one week. Specimens were then imaged at the University of British Columbia Herbarium (Fig. 5). Species were identified using dichotomous keys for plants of this area, including *Flora of the Pacific Northwest* by C.L. Hitchcock and A. Cronquist, and the ongoing project *Flora of North America* project.



**Figure 5:** Collection number and Latin name of nine plants out of 45 specimens collected



## Results

Across the three survey areas, a total of 34 unique species were found. Of these, five were found at all three locations, while seven other species were found in more than one location (See Appendix Table A1). One species, *Vinca* sp. (found in Block F), could not be identified beyond genus level due to a lack of reproductive features present. However, proximity to residential areas and gardens suggests that it is likely *Vinca minor* (Common Periwinkle), which is commonly grown as an ornamental plant. The species were classified as native, exotic, or invasive using plant lists from MacKenzie et al. (2016), and the Province of British Columbia Invasive Alien Plant Program (IAPP), and the Invasive Species Council of British Columbia.

### Totem Park (TP)

13 species were found in this area. 7 were classified as native species, 4 were invasive, and 2 were exotic but not known to be invasive (Table 1). Known invasives include *Hedera helix* (English Ivy), *Ilex aquifolium* (English Holly), *Ranunculus repens* var. *repens* (Creeping Buttercup), and *Rubus armeniacus* (Himalayan Blackberry). *Hedera helix* was found climbing up some trees. Plants in this area were found in higher abundance near the edges of the wooded area of the park. Shrubs in the heart of the tall conifers were sparse, and small herbaceous plants were far in-between.

**Table 1:** List of plant species (trees excluded) found in Totem Park on the University of British Columbia campus; sorted into “native”, “exotic”, and “invasive” according to various BC plant species lists.

Native	Exotic	Invasive
<i>Mahonia aquifolium</i>	<i>Lapsana communis</i>	<i>Hedera helix</i>
<i>Plantago major</i> var. <i>major</i>	<i>Prunella vulgaris</i> var. <i>vulgaris</i>	<i>Ilex aquifolium</i>
<i>Polystichum munitum</i> var. <i>munitum</i>		<i>Ranunculus repens</i> var. <i>repens</i>
<i>Rubus spectabilis</i>		<i>Rubus armeniacus</i>
<i>Rubus ursinus</i>		
<i>Symphoricarpos albus</i> var. <i>laevigatus</i>		
<i>Vaccinium parvifolium</i>		

### Thunderbird Bus Stop (TBS)

19 species were found in this area. Of these, 9 were native, 5 were known invasives, and 4 were general exotics (Table 2). Known invasives unique to this area include *Geranium robertianum* (Robert’s Geranium), *Hedera helix* (English Ivy), *Hypericum perforatum* (St. John’s Wort), *Ilex aquifolium* (English Holly), and *Rubus armeniacus* (Himalayan Blackberry). *Hedera helix* was found climbing up several trees. Distribution of plants was clustered. Individuals of species such as *Rubus spectabilis* and *Vaccinium parvifolium* were found only in one spot and nowhere else in the area. Many species, such as *Rosa gymnocarpa*, *Hypericum perforatum*, and *Plantago* spp. were found in very low abundance (< 5 individuals throughout the entire area).

**Table 2:** List of plant species (trees excluded) found in the park area next to bus stop 59727 on the University of British Columbia campus; sorted into “native”, “exotic”, and “invasive” according to various BC plant species lists.

<b>Native</b>	<b>Exotic</b>	<b>Invasive</b>
<i>Gaultheria shallon</i> <i>Mahonia nervosa</i> <i>Plantago major var. major</i> <i>Polystichum munitum var. munitum</i> <i>Pteridium aquilinum</i> <i>Rosa gymnocarpa</i> <i>Rubus spectabilis</i> <i>Rubus ursinus</i> <i>Vaccinium parvifolium</i>	<i>Lactuca muralis</i> <i>Lapsana communis</i> <i>Plantago lanceolata</i> <i>Trifolium pratense</i>	<i>Geranium robertianum</i> <i>Hedera helix</i> <i>Hypericum perforatum</i> <i>Ilex aquifolium</i> <i>Rubus armeniacus</i>

Block F (BF)

20 species were found in this area. Of these, 13 were native, 3 were invasive, and 3 were exotic (Table 3). Known invasives include *Cytisus scoparius* (Scotch Broom), *Ilex aquifolium* (English Holly), and *Ranunculus repens var. repens* (Creeping Buttercup). This area differed greatly from the previous two in its greater proportion of deciduous trees and shrubs, and its dense distribution of these plants. Some introduced ornamental plant species were found here, such as *Cotoneaster* spp., and *Vinca* sp. These species may have spread from nearby gardens, as the *Cotoneaster* was found in areas closest to the residential buildings, and the *Vinca* was found spreading from the very edge of the forest.

**Table 3:** List of plant species (trees excluded) found in the section of Block F that lies between Agronomy Rd and Thunderbird Blvd on the University of British Columbia campus; sorted into “native”, “exotic”, and “invasive” according to various BC plant species lists.

<b>Native</b>	<b>Exotic</b>	<b>Invasive</b>
<i>Athyrium filix-femina</i> <i>Blechnum spicant</i> <i>Cornus canadensis</i> <i>Gaultheria shallon</i> <i>Geum macrophylla</i> <i>Juncus tenuis</i> <i>Lonicera involucrata var. involucrata</i> <i>Mahonia nervosa</i> <i>Plantago major var. major</i> <i>Rubus parviflorus</i> <i>Rubus spectabilis</i> <i>Rubus ursinus</i> <i>Tiarella trifoliata var. trifoliata</i>	<i>Cotoneaster simonsii</i> <i>Cotoneaster transens</i> <i>Lapsana communis</i> <i>Vinca</i> sp.	<i>Cytisus scoparius</i> <i>Ilex aquifolium</i> <i>Ranunculus repens var. repens</i>

## *Natives/Invasives*

Most of the species found in this study are also commonly found in this region in BC. Species such as *Vaccinium parvifolium* (Red Huckleberry), *Rubus ursinus* (Trailing Blackberry), *Rubus spectabilis* (Salmonberry), *Polystichum munitum* (Sword Fern), *Mahonia nervosa* (Dull Oregon Grape), *Rubus parviflorus* (Thimbleberry), and *Cornus canadensis* (Bunchberry) are well known BC natives that are consistently found in Pacific Spirit Park (Super et al. 2013). These species would be important to preserve if a green corridor were put into the area, as they would positively contribute to native biodiversity. As well, many of these species, such as Red huckleberry, Salmonberry, and Thimbleberry, produce edible fruit that benefits birds and other local wildlife.

While most species found in each of the areas were native, several invasive species of concern were also found. *Cytisus scoparius* (Scotch Broom), *Hedera helix* (English Ivy), *Ilex aquifolium* (English Holly), and *Rubus armeniacus* (Himalayan Blackberry) are of particular concern due to their ability to spread quickly and their potential to cause ecological damage. These species are consistently targeted by environmental groups as they are often found taking over large areas of local parks. *Cytisus scoparius* aggressively spreads through disturbed sites and open woods, competes with conifer seedlings, and has been found to cause failure in regeneration of Douglas fir stands in Oregon and Washington (Peterson and Prasad 1998). *Rubus armeniacus* is known to form dense mats, excluding other vegetation, and threatening native biodiversity (Soll 2001). As well, *Hedera helix* will form extensive patches of continuous cover that have been found to decrease native biodiversity (Duglosch 2005). These will require significant attention, as the implementation of green corridor plants would be threatened by the spread of these invasive plants.

## **Conclusion**

There may be potential for a green corridor to incorporate some of the existing areas along Agronomy Rd. The three areas surveyed contain a good number of native species that would help the green corridor positively impact biodiversity on campus. They also contain many important fruit bearing plants that would be beneficial to campus wildlife. However, the presence of invasive species raises concerns. As this study does not quantify the abundance of each species found, further study is needed to fully assess the current state of invasives such as Himalayan blackberry and English ivy in the area so that measures may be put into place to properly monitor and remove them.

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## Appendix

**Table A1:** Full list of non-tree species found at each site. Several species were found at more than one site.

<b>Totem Park (TP)</b>	<b>Thunderbird Bus Stop (TBS)</b>	<b>Block F (BF)</b>
<i>Hedera helix</i> †	<i>Gaultheria shallon</i> ‡	<i>Athyrium filix-femina</i>
<i>Ilex aquifolium</i> *	<i>Geranium robertianum</i>	
<i>Lapsana communis</i> *	<i>Hedera helix</i> †	<i>Blechnum spicant</i>
<i>Mahonia aquifolium</i>	<i>Hypericum perforatum</i>	<i>Cornus canadensis</i>
<i>Plantago major</i> var. <i>major</i> *	<i>Ilex aquifolium</i> *	<i>Cotoneaster simonsii</i>
<i>Polystichum munitum</i> var. <i>munitum</i> †	<i>Lactuca muralis</i>	<i>Cotoneaster transens</i>
<i>Prunella vulgaris</i> var. <i>vulgaris</i>	<i>Lapsana communis</i> *	<i>Cytisus scoparius</i>
<i>Ranunculus repens</i> var. <i>repens</i> §	<i>Mahonia nervosa</i> ‡	<i>Gaultheria shallon</i> ‡
<i>Rubus discolor</i> †	<i>Plantago lanceolata</i>	<i>Geum macrophylla</i>
<i>Rubus spectabilis</i> *	<i>Plantago major</i> var. <i>major</i> *	<i>Ilex aquifolium</i> *
<i>Rubus ursinus</i> *	<i>Polystichum munitum</i> var. <i>munitum</i> †	<i>Juncus tenuis</i>
<i>Symphoricarpos albus</i> var. <i>laevigatus</i>	<i>Pteridium aquilinum</i>	<i>Lapsana communis</i> *
<i>Vaccinium parvifolium</i> †	<i>Rosa gymnocarpa</i>	<i>Lonicera involucrata</i> var. <i>involucrata</i>
	<i>Rubus discolor</i> †	<i>Mahonia nervosa</i> ‡
	<i>Rubus spectabilis</i> *	<i>Plantago major</i> var. <i>major</i> *
	<i>Rubus ursinus</i> *	<i>Ranunculus repens</i> var. <i>repens</i> §
	<i>Trifolium pratense</i>	<i>Rubus parviflorus</i>
	<i>Vaccinium parvifolium</i> †	<i>Rubus spectabilis</i> *
		<i>Rubus ursinus</i> *
		<i>Tiarella trifoliata</i> var. <i>trifoliata</i>
		<i>Vinca</i> sp.

\*species found at all three sites, †species found at both TP and TBS, ‡species found at both TBS and BF, §species found at both TP and BF.