NATIVE PLANT FORAGE FOREST MONITORING

REPORT PREPARED FOR
THE GALIANO CONSERVANCY ASSOCIATION

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RESTORATION OF NATURAL SYSTEMS PROGRAM

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1. PROJECT BACKGROUND

The Native Plant Forage Forest (NPFF) is a unique ecological and ethnocultural restoration project initiated by the Galiano Conservancy Association (GCA) on Galiano Island. The site is located at the Millard Learning Centre (Fig.1), a one-of-a-kind property which combines the delivery of innovative environmental education programs and the protection of sensitive coastal habitats. The NPFF aims to act as a model forest, where native plant species traditionally used for food and medicine can help to restore a degraded area, while also fostering a connection with the land and its people.

Fig. 1. The Millard Learning Centre (DL 57), a 76ha property located mid-Galiano Island, BC. Map produced by the GCA, 2012.

ISSUES: The site chosen for the implementation of this forage forest has been heavily impacted by human use, having been logged by its previous owner for approximately 10 years before the Galiano Conservancy acquired the property in 2012. Machine use was extensive, which caused the soils to be heavily compacted and facilitated the colonization of exotic thistles and invasive agricultural grasses. Grazing by black-tailed deer and feral sheep was also an issue, as it prevented the regeneration of native trees and shrubs which were palatable to these animals. Culturally speaking, fostering long-lasting partnerships with First Nations and community groups was also a priority, in order to allow an appropriate space for reconciliation, healing and the sharing of similar sustainable and ecological values.

PROPOSED TREATMENTS: Restoration treatments which focused on de-compacting the soils, removing invasive vegetation and fencing the area to prevent ungulate grazing began in 2017 and are expected to continue throughout 2018 (see Section 2 for a detailed project timeline). As the site presents a variety of soil moisture regimes, ranging from a gradient of dry to very wet conditions, a diverse range of native species associated with different Southern Gulf Islands ecosystems are to be established. An edible berries trail with shrubs such as gooseberry,

salmonberry and huckleberry was also envisioned, so that children and visitors can forage for food while partaking in the natural beauty of the site. By integrating traditional ecological knowledge and teachings, it is hoped that the NPFF will become a shared space where community members and First Nation groups alike will be able to learn from one another and engage with each other and the land.

The five main objectives of this project are as follows (from Huggins, 2017):

1. Restore ecological function and structure to logged and degraded site

2. Engage the Penelakut and Galiano communities in the planning, treatment, and ongoing management of the restoration site

3. Document the creation and evolution of the project through various media

4. Produce harvestable native plant foods, medicines, and materials

5. Monitor the site, report results, and adapt management according

2. PROJECT TIMELINE

Fig.2 below presents the major events which occurred, are ongoing, and are expected to occur for the NPFF project.

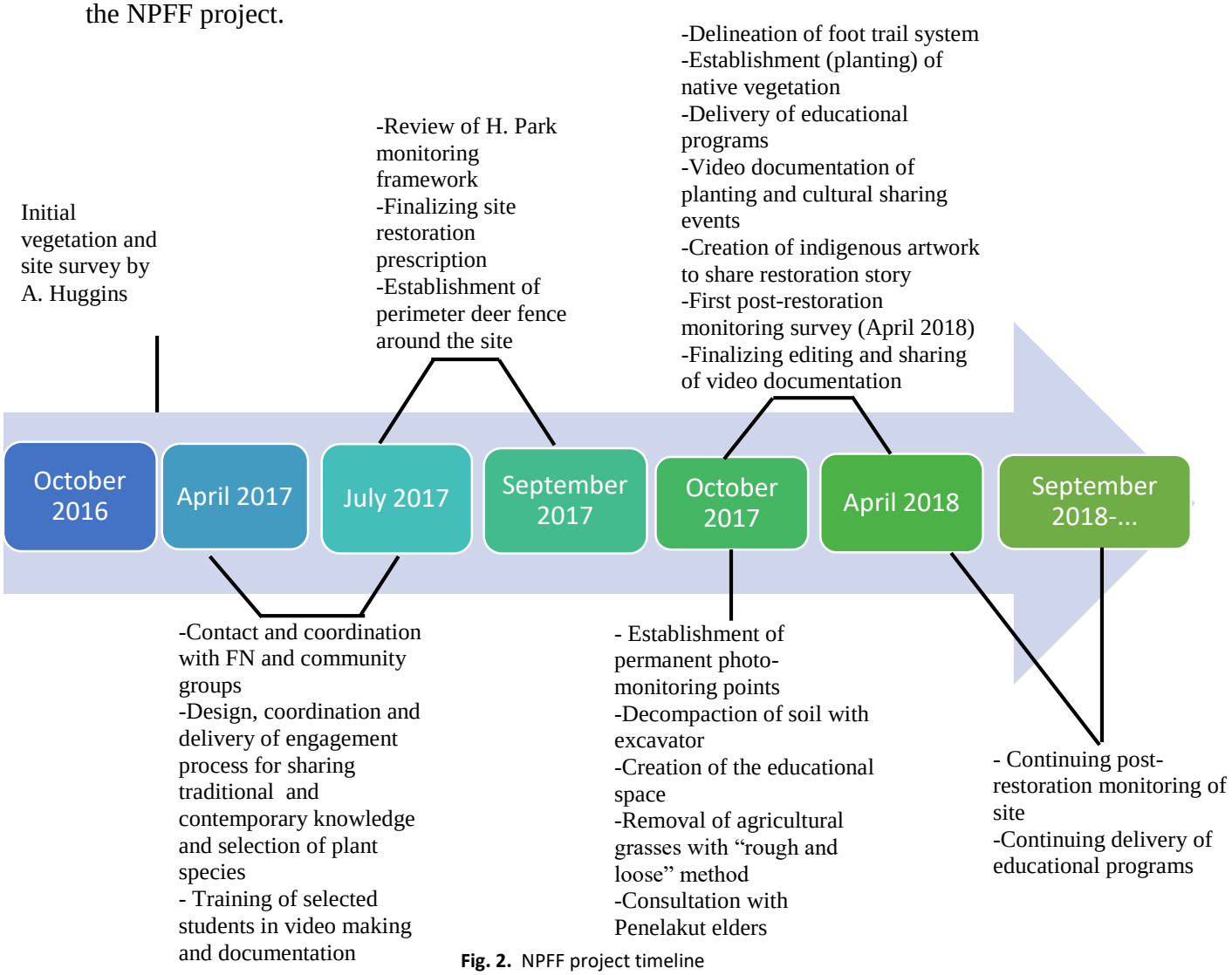

Fig. 2. NPFF project timeline

3. REPORT OBJECTIVES

CONTEXT: As part of her thesis work, Master student H. Park from the University of Victoria developed, in consultation with the GCA and food forestry experts, a comprehensive monitoring framework in order to assist the GCA in evaluating how effectively they are reaching their restoration and ethnocultural goals for both of their food forestry projects. This customized framework is meant to be a long-term monitoring tool which will provide consistent feedback and aid towards the adaptive management of both sites.

This report thus aims to present the first monitoring results following this framework methodology. Its specific objectives are to:

1. Complete the first post-restoration ecological monitoring of the NPFF site, following the monitoring indicator framework as described in Park and Higgs (2018).

2. Inform the GCA and interested stakeholders of important changes regarding the composition and structure of the NPFF since the site was restored in October 2017

3. Provide recommendations in order to improve future monitoring of the site

4. Provide a standardized template for future monitoring use of the site

4. SUMMARY OF MONITORING RESULTS

Table 1 below provides a summary of the post-restoration monitoring of the NPFF site which occurred between April 6th and April 20th 2018.

Here are some of the most important findings from this first monitoring survey:

- Total plant species richness increased from 59 to 102 from pre-restoration of the site (October 2016) to post-restoration (April 2018). For a list of all species surveyed, please see Annex B
- Overall herbaceous plants still represent the most important structural layer in the Native Plant Forage Forest, occupying approximately 75% of the total site land cover
- Tree density is quite low, with only 4 trees/ha. On the other hand, stump density is approximately 156/ha, which highlights the past use of this area as a logging site
- Approximate coarse woody debris (CWD) volume is 14m^3 for the site, or 28m^3/ha. For additional details on the importance of CWD in forested ecosystems and how its volume was calculated, please see section 4.1
- Overall exposed soil, which is mainly generated by the planting beds, occupies 18.1% of the total site area (see Annex A for a map of site cover)
- Most of the native plants species occupying the site belong to the trees, woody perennials and mosses structural layers, while most of the invasive species are from the herbaceous layer
- There have been 257 visitors to the NPFF site, with groups ranging between elementary school children, university students and adults
- There have been 140 volunteers who contributed 1060 volunteer hours to the project

Table 1. Summary of monitoring results according to indicator framework as described in Park and Higgs (2018).

SURVEY DATE: April 6th 2018					
Principle	**Criteria**	**Indicator**	**Core Measure**	**Result**	**References used**
Ecological integrity	Integrity of biotic community	Plant Diversity	Species richness	Trees: 10 Woody perennials: 23 Herbs: 58 Mosses/lichens/fungi: 11	Gibson, 2017, Huggins, 2017, Pojar and MacKinnon, 1994, Goward et al., 1994, Vitt et al., 1988
			Total Species richness	**102**	
			% cover	Trees: 5 Woody perennials: 18 Herbs: 75 Mosses/lichens/fungi: 2	
			% Forest based understory	30	
			% Grasses	70	
			Tree density	4/ha	
			Stump density	156/ha	
	Habitat quality	Habitat structural diversity	Volume of CWD	14m³	Baker and Chao, 2011, BC Ministry of Forests and Range and BC Ministry of Environment, 2010, Yan et al., 2006, Densmore et al., 2004, Feller 2003.
			Volume of FWD	N/A	
			Volume of snags	5.9m³	
		Landscape connectivity	% Area of roads and footpaths	8.7	See Annex A
	Ecological processes	Succession	Repeat photography	See PP01, PP02 and PP03	
	Soil	Soil erosion	% of Exposed soil	18.1	

Informed by past and future	Historical knowledge	Historical biological community or processes	% Native cover	Trees: 100 Woody perennials: 98 Herbs: N/A* Mosses/lichens/fungi: 100	Huggins, 2017
Social benefits and engagement	Cultural values and social equity	Food security	Destination of products and food produced	N/A	K. Erickson, 2018, Pers. Communication
		Cultural identity and spiritual values	Aboriginal participation	Number of elders who were involved: 6	
				Number of events with aboriginal participation: 4	
	Economic benefits	Yield	Income from yield and other activities	N/A	
		Employment	Number of jobs created	1 FTE job created	
	Outreach, education and training	Acquisition of knowledge and skills	Number of education and outreach events	12	
			Number and demographics of visitors	**Total number: 257**	
				Demographics: Elementary school: 110 High school: 0	

				University: 59 Adults: 88	
		Research and science	Number of research/education projects and individuals studying the system	4 research projects and 4 students studying the system	
Long-term sustainability	Resilience and stability	Prepared and resilient to extreme weather	Crop failure after extreme weather	N/A	K. Erickson, 2018, Pers. Communication
		Self-regulating	Outbreaks of disease	N/A	
	Economic self-sufficiency	True yield	Input and cost	Number of volunteers: 140 **Total Volunteer hours: 1060**	
	Governance	Collaborative participation	Number of collaborators involved in the project	5 organizations collaborating (GCA, PIES, GCS, AMES, UVIC) plus 10 individual collaborators	

* ID of grasses was not feasible at the time, due to lack of inflorescence

4.1 COARSE WOODY DEBRIS

Coarse Woody Debris (CWD) occupy an important function in forested ecosystems by providing habitat for a variety of species, while also being an important source of carbon and nutrients to the forest floor (Feller, 2003, Densmore et al., 2005, Gough et al., 2007). Although definitions vary as to what constitutes exactly CWD in terms of size and diameter (Yan et al., 2006), for the purpose of this report the definition from the BC Field Manual for Describing Terrestrial Ecosystems 2nd Edition (2010) was adopted. This manual describes CWD as "dead woody material, in various stages of decomposition, located above the soil, larger than 7.5cm in diameter and not self-supporting" (BC Ministry of Forests and Range and BC Ministry of Environment, 2010).

The methodology described in Baker and Chao (2011) was used in order to calculate the volume of CWD at the site. This required for the diameters at both ends of all cylindrical/conical pieces of CWD to be measured, along with the total length of the woody debris (for complete results of CWD volume calculations, see Annex C).

Although there is no set amount of CWD required on a site in order to maintain a healthy forest ecosystem, research suggests that a natural old growth forest can have anywhere between 19 to 120m^3 of CWD/ha (Sippola et al., 1998, Densmore et al., 2005). The NPFF site currently presents 28m^3 of CWD/ha, which means that some CWD might need to be added manually in order to replicate old forest structure and function. However, the NPFF may also reach this amount on its own, as it matures with time. Additionally, it is important to take into account potential overestimations and underestimations of CWD at the site, which resulted from the surveying and calculation method.

One issue with the Baker and Chao method is that it can overestimate the volume of CWD if the piece does not have a complete cylindrical or conical shape. Furthermore, it was impossible to record the volume of some pieces at the site, as they were located underneath a pile of larger CWD (see Fig. 3). The result given for CWD volume should therefore be taken as an estimation and not a precise amount. In order to standardize the process, it is recommended that surveyors combine volume calculations with a transect methodology, such as one described in the BC Field Manual for Describing Terrestrial Ecosystems.

4.2 SITE COVER

An estimation of the total area of the site along with the cover of specific components was performed using the Trimble GeoXH geospatial data collector. Collected data was then analysed and displayed with ArcGIS 10.6. Table 2 below presents the NPFF site cover data. For a complete map of the area, please see Annex A.

Table 2. NPFF site cover

Total Fenced area (m^2)	% Cover of Exposed soil	% Cover of vegetated-grass dominated	% Cover vegetated (other)	% of Rock cover
5473	18.1	8.7	69.9	3.2

An important discussion item to mention here is the percentage of exposed soil at the site. One of the indicators from the Park and Higgs (2018) monitoring framework states that there should be less than 5% of exposed soil, and currently the NPFF has approximately 18% of exposed soil, which normally would be considered as problematic for soil erosion. However, as most of this exposed soil cover is due to the creation of planting beds and the education circle, it is expected that this percentage will decrease in upcoming years, as native plants and grasses become established.

4.1 PHOTO-POINT MONITORING

Three permanent photo-points were established prior to the restoration of the site, in October 2017. The first set of photos were taken October 2nd 2017, and the first post-restoration repeat photos were taken on April 20th 2018. The metadata for these photo-points is presented in Table 3 below. For a visual representation of their location, please see NPFF map in Annex A. Actual photo-point imagery is presented in Table 4.

The camera used for the original photos was unfortunately not the same as the one used for the repeat photos. The camera used for the April 20th photos was a Canon PowerShot ELPH 125 with a 28-224mm F3.2-6.9 8x zoom lens. As the lenses were not identical for both cameras, images depth may be slightly different. It is recommended that the same camera be used for all future photo-point monitoring work.

Table 3. NPFF photo-monitoring metadata

	Northing	**Easting**	**Azimuth 1 (°)**	**Azimuth 2 (°)**	**Lens height (m)**	**Distance to board (m)**
Photo-point 1	5419615	465679	325	37	1.4	10
Photo-point 2	5419623	465706	240	334	1.4	10
Photo-point 3	5419691	465678	174	222	1.49	No board. Centre Azimuth 1 at base of arbutus and Azimuth 2 at base of cedar seedling on top of stump

Table 4. NPFF photo-point monitoring imagery, pre and post site restoration, for the three permanent photo-points at the site

	Oct 2nd 2018	April 20th 2018
PP01	Azimuth 1 	
	Azimuth 2 	

PP02	Azimuth 1  
	Azimuth 2  

PP03	Azimuth 1	 
	Azimuth 2	 

4.2 PHOTO DOCUMENTATION

A visual documentation of the site was performed in April 2018 in order to capture the most important changes and features of the NPFF at the time. Figures 3 to 10 present these features below. For best comprehensive results, photo documentation should be a seasonal monitoring task at the NPFF site.

Fig. 3. Pile of CWD near the wetland area, adding nutrients and C to the soil

Fig. 4. Education circle is being colonized by grasses. Woodland strawberries have been planted along its perimeter

Fig. 5. Top planting bed, with camas and a flowering Sea blush (*Plectritis congesta*)

Fig. 6. Previous hollowed out stump now a nursery stump, planted with Red huckleberry (*Vaccinium parvifolium*)

Fig. 7. Wetland area in western portion of the site, water loving plants such as Skunk cabbage *(Lysichiton americanus*) are to be planted

Fig. 8. Another wet area, north-west on the site, next to the wetland.

Fig. 9. Top three beds, planted with Garry Oak meadow-like plants such as camas (*Camassia quamash*), Sea blush (*Plectritis congesta*), and Shootingstars (*Dodecatheon pulchellum*)

Fig. 10. South-West perimeter bed, planted mostly with forest understory plants such as Oregon grape (*Mahonia aquifolium* and *Mahonia nervosa*)

5. RECOMMENDATIONS

The following recommendations have resulted as reflections after the first post-restoration monitoring survey. They are meant to inform the GCA and future surveyors of the area in order to improve the management of this Forage Forest.

1. Plant inventory surveys should be performed in the summer, when grass inflorescence is present, to facilitate identification of the different species.

2. Permanent vegetation survey quadrats may provide a more accurate and comparable representation of species richness at the site. At present, the entire site was surveyed, which may not truly reflect all species present in the area, due to individual capacity at plant identification and also seasonal variations.

3. The same camera (make, model, lens) should be used for photo-point monitoring. Even with precise orienteering and measurement, different camera lenses can lead to different depth perceptions, which will not provide exact replicas of images for comparison.

4. Images from the repeat photography should not be overexposed, in order to allow all features to be clearly visible. To facilitate this process, ISO settings should be recorded, as well as taking the photographs at same time of day, during the same season.

5. Photo-point monitoring should be undertaken at the same time, ideally once every season, in order to properly capture vegetation changes throughout the year and to facilitate comparison of images (McDougald et al., 2003). If resources are not available for seasonal photography, repeat images should be taken at least once a year.

6. A line transect method, as described in the BC Field Manual for Describing Terrestrial ecosystems, 2nd Edition, should be used for sampling CWD. Volume calculations should then be based on size and shape of surveyed pieces.

7. Site photo documentation should also be undertaken seasonally or least once a year, in order to document major changes in the structure and composition of the Forage Forest.

6. CONCLUSION

This report provided results of the first post-restoration monitoring of the Native Plant Forage Forest project, following the comprehensive framework as described in Park and Higgs (2018). A separate monitoring template is provided with this report, which can be used for future surveying and data update of the area. A systematic and consistent approach to monitoring this site is essential in order to adapt to change and allow for ecosystem and socio-cultural resilience and regeneration.

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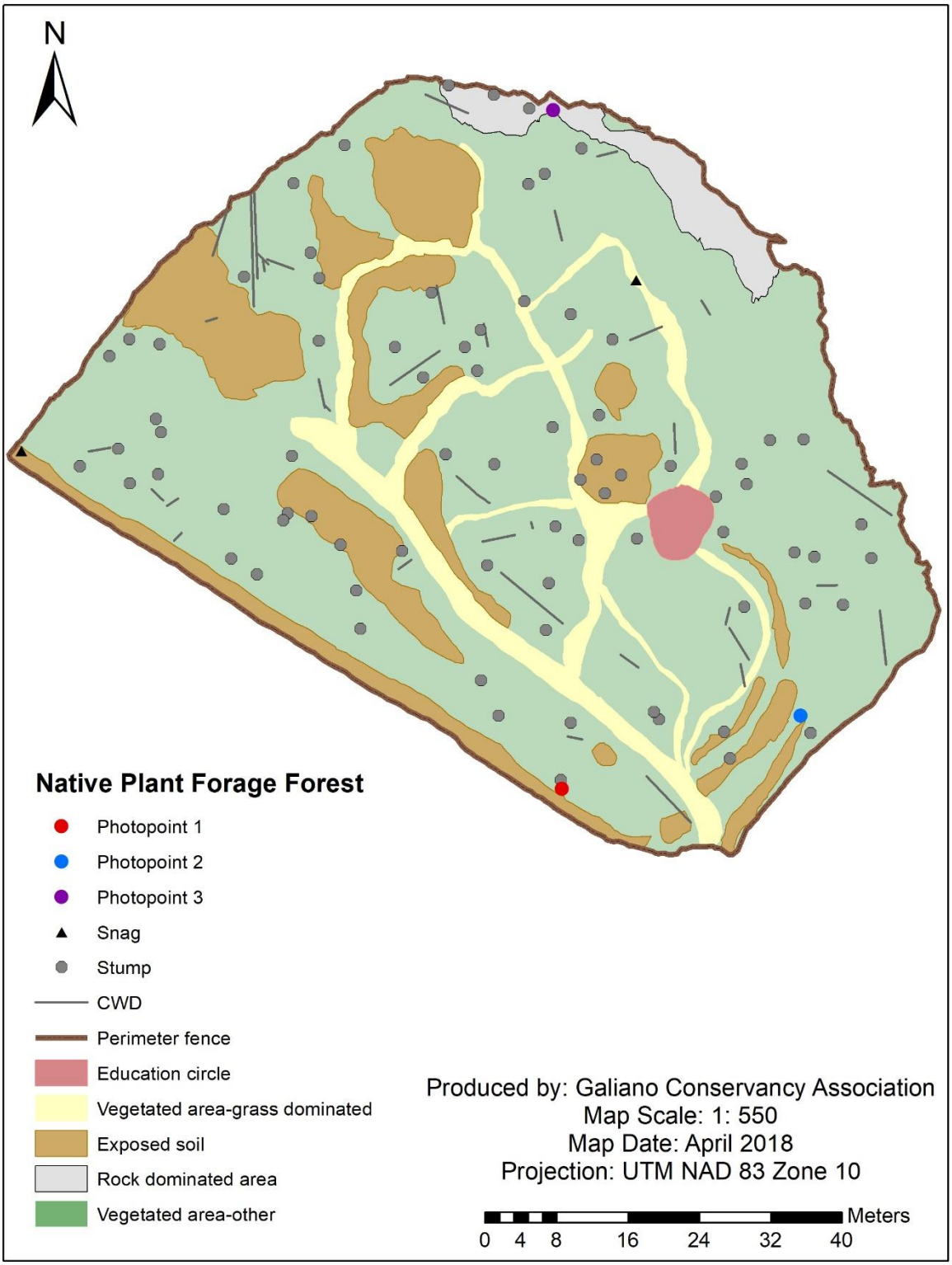
ANNEX A: Native Plant Forage Forest Map



ANNEX B: Plant Inventory List

Layer	Latin name	Common name	Baseline survey (18/10/2016)	Species richness (18/10/2016)	Nursey additions (15/12/2017)	Monitoring Spring 2018 (06/04/2018)	Species richness monitoring Spring 2018 (06/04/2018)	% cover Monitoring Spring 2018 (06/04/2018)	Total species richness
A	*Alnus rubra*	Red Alder	x	4		x	10	5	10
A	*Arbutus menziesii*	Pacific Madrone	x		x	x			
A	*Pseudotsuga menziesii*	Douglas-fir	x			x			
A	*Thuja plicata*	Western Redcedar	x			x			
A	*Acer macrophyllum*	Bigleaf Maple			x	x			
A	*Crataegus douglasii*	Black Hawthorn			x	x			
A	*Quercus garryana*	Garry Oak			x	x			
A	*Salix scouleriana*	Scouler's Willow			x	x			
A	*Taxus brevifolia*	Western Yew			x	x			
A	*Malus fusca*	Pacific Crabapple			x	x			
B	*Amelanchier alnifolia*	Saskatoon Berry	x	12	x	x	23	18	23
B	*Gaultheria shallon*	Salal	x			x			
B	*Holodiscus discolor*	Oceanspray	x			x			
B	*Ilex aquifolium*	English Holly	x			x			
B	*Lonicera hispidula*	Hairy Honeysuckle	x			x			
B	*Paxistima myrsinites*	Falsebox	x			x			
B	*Rubus laciniatus*	Cutleaf Blackberry	x			x			
B	*Rubus leucodermis*	Blackcap Raspberry	x		x	x			
B	*Vaccinium ovatum*	Evergreen Huckleberry	x		x	x			
B	*Vaccinium parvifolium*	Red Huckleberry	x		x	x			
B	*Mahonia aquifolium*	Tall Oregon Grape			x	x			
B	*Mahonia nervosa*	Dull Oregon Grape	x		x	x			
B	*Oemleria cerasiformis*	Indian Plum			x	x			
B	*Ribes divaricatum*	Wild Gooseberry			x	x			

Layer	Latin name	Common name	Baseline Survey (18/10/2016)	Species richness (18/10/2016)	Nursery additions (15/12/2017)	Monitoring Spring 2018 (06/04/2018)	Species richness monitoring Spring 2018 (06/04/2018)	% cover Monitoring Spring 2018	Total species richness
B	*Ribes sanguineum*	Red-flowering Currant			x	x			
B	*Rosa gymnocarpa*	Baldhip Rose			x	x			
B	*Rosa nutkana*	Nootka Rose			x	x			
B	*Rubus parviflorus*	Thimbleberry			x	x			
B	*Rubus spectabilis*	Salmonberry	x		x	x			
B	*Sambucus racemosa*	Red Elderberry			x	x			
B	*Shepherdia canadensis*	Soopalalie			x	x			
B	*Spiraea douglasii*	Hardhack			x	x			
B	*Viburnum edule*	Highbush Cranberry			x	x			
C	*Achlys triphylla*	Vanilla Leaf	x	41			40	75	58
C	*Agrostis capillaris*	Colonial Bentgrass	x						
C	*Anaphalis margaritacea*	Pearly Everlasting	x			x			
C	*Arctium minus*	Burdock	x			x			
C	*Athyrium filix-femina*	Lady Fern	x						
C	*Bromus carinatus*	California Brome	x						
C	*Cirsium arvense*	Canada Thistle	x			x			
C	*Cirsium vulgare*	Bull Thistle	x						
C	*Dactylis glomerata*	Orchard Grass	x						
C	*Digitalis purpurea*	Foxglove	x			x			
C	*Elymus glaucus*	Blue Wild Rye	x						
C	*Elymus repens*	Couch Grass	x						
C	*Epilobium angustifolium*	Fireweed	x			x			
C	*Equisetum telmateia*	Giant Horsetail	x			x			
C	*Galium aparine*	Cleavers	x			x			
C	*Gamochaeta ustulata*	Purple Cudweed	x			x			
C	*Geranium molle*	Dovesfoot Geranium	x			x			
C	*Heuchera micrantha*	Crevice Alumroot	x			x			
C	*Holcus lanatus*	Velvet Grass	x						

Layer	Latin name	Common name	Baseline Survey (18/10/2016)	Species richness (18/10/2016)	Nursery additions (15/12/2017)	Monitoring Spring 2018 (06/04/2018)	Species richness monitoring Spring 2018 (06/04/2018)	% cover Monitoring Spring 2018	Total species richness
C	*Hypochaeris radicata*	Cat's-ear	x			x			
C	*Juncus effusus*	Common Rush	x						
C	*Linnaea borealis*	Twinflower	x						
C	*Mycelis muralis*	Wall Lettuce	x			x			
C	*Nemophila parviflora*	Oak Nemophila	x						
C	*Plantago lanceolata*	English Plantain	x			x			
C	*Poaceae spp.*	-	x						
C	*Polypodium glycyrrhiza*	Licorice Fern			x	x			
C	*Polystichum munitum*	Sword Fern	x			x			
C	*Prunella vulgaris*	Self-heal	x			x			
C	*Pteridium aquilinum*	Bracken Fern	x						
C	*Ranunculus repens*	Creeping Buttercup	x			x			
C	*Rubus ursinus*	Trailing Blackberry	x			x			
C	*Rumex acetosella*	Sheep Sorrel	x			x			
C	*Scirpus microcarpus*	Small-fruited Bulrush	x						
C	*Senecio vulgaris*	Common Groundsel	x			x			
C	*Silene coronaria*	Rose Campion	x						
C	*Sonchus asper*	Prickly Sow-thistle	x			x			
C	*Stellaria graminea*	Common Starwort	x						
C	*Trientalis latifolia*	Starflower	x						
C	*Torilis arvensis*	Hedge Parsley	x			x			
C	*Urtica dioica*	Stinging Nettles	x			x			
C	*Vicia sativa*	Common Vetch	x			x			
C	*Cardamine hirsuta*	Hairy Bittercress				x			
C	*Achillea millefolium*	Yarrow			x	x			
C	*Allium cernuum*	Nodding Onion			x	x			
C	*Camassia leichtlinii*	Great Camas			x	x			
C	*Camassia quamash*	Common Camas			x	x			

Layer	Latin name	Common name	Baseline Survey (18/10/2016)	Species richness (18/10/2016)	Nursery additions (15/12/2017)	Monitoring Spring 2018 (06/04/2018)	Species richness monitoring Spring 2018 (06/04/2018)	% cover Monitoring Spring 2018	Total species richness
C	*Clinopodium douglasii*	Yerba Buena			x	x			
C	*Festuca roemeri*	Roemer's Fescue			x	x			
C	*Fragaria vesca*	Woodland Strawberry			x	x			
C	*Sisyrinchium idahoense*	Idaho Blue-eyed Grass			x	x			
C	*Artemisia suksdorfii*	Coastal sage			x	x			
C	*Trifolium wormskjoldii*	Springbank Clover			x	x			
C	*Dodecatheon pulchellum*	Few-flowered Shootingstar			x	x			
C	*Heracleum maximum*	Cow-parsnip			x	x			
C	*Lomatium nudicaule*	Barestem Desert-parsley			x	x			
C	*Lysichiton americanus*	Skunk Cabbage			x	x			
C	*Plectritis congesta*	Sea blush			x	x			
D	*Kindbergia oregana*	Oregon Beaked Moss	x	2		x	11	2	11
D	*Polytrichum spp.*	Haircap Moss	x			x			
D	*Hylocomium splendens*	Stairstep Moss				x			
D	*Kindbergia praelonga*	Common Feathermoss				x			
D	*Hypogymnia inactiva*	Forking Bone				x			
D	*Platismatia glauca*	Ragbag				x			
D	*Cladonia macilenta*	Lipstick Cladonia				x			
D	*Cladonia chlorophaea*	False Pixie Cup				x			
D	*Cladonia spp.*	Cladonia scales				x			
D	*Lichenomphalia umbellifera*	Heath Navel				x			
D	*Cerrena unicolor*	Mossy Maze Polypore				x			
TOTAL	*N/A*			**59**	*N/A*		**84**	**100**	**102**

Annex C: Coarse Woody Debris Volume Calculation

CWD	Diameter 1 (m)	Diameter 2 (m)	Length (m)	Volume (m^3)	Class	Notes
1	0.07	0.3	7.12	0.27	1	
2	0.14	0.22	1.65	0.04	4	
3	0.14	0.12	1.22	0.02	3	
4	0.54	0.62	1.90	0.50	1	Leaning
5	0.41	1.04	1.52	0.75	3	
6	0.58	0.15	1.82	0.26	3	
7	0.34	0.13	2.47	0.13	2	
8	0.28	0.3	2.10	0.14	2	Under stump
9	0.36	0.15	12.41	0.74	1	
10	0.32	0.19	9.59	0.52	1	
11	0.31	0.34	5.32	0.44	2	
12	0.42	0.4	1.25	0.16	3	
13	0.12	0.21	1.26	0.03	2	
14	0.35	0.24	3.15	0.22	3	
15	0.11	0.28	1.71	0.06	2	
16	0.39	0.15	3.29	0.23	3	
17	0.43	0.31	1.01	0.11	2	
18	0.25	0.32	5.21	0.34	2	
19	0.38	0.4	3.40	0.41	2	
20	0.22	0.33	2.31	0.14	3	
21	0.1	0.39	3.87	0.25	2	
22	0.23	0.12	1.78	0.05	2	
23	0.25	0.3	3.39	0.20	3	
24	0.31	0.54	4.32	0.66	3	
25	0.23	0.17	6.73	0.22	3	
26	0.41	0.46	2.58	0.38	4	
27	0.94	0.6	4.75	2.32	4	
28	0.38	0.4	0.75	0.09	2	
29	0.34	0.36	3.74	0.36	1	
30	0.29	0.48	8.94	1.10	2	
31	0.18	0.14	2.47	0.05	2	
32	0.26	0.21	2.52	0.11	5	
33	0.2	0.31	4.18	0.22	5	
34	0.3	0.33	1.89	0.15	3	
35	0.27	0.35	6.10	0.47	1	
36	0.31	0.28	2.22	0.15	2	
37	0.39	0.59	8.67	1.70	2	
TOTAL Volume CWD				**13.99**		