Youth and Ecological Restoration Program
Ecological Inventory of the Upper Headwaters of the South Millard Creek tributary

Prepared By

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I INTRODUCTION

A Purpose of Study

This report documents information collected during three days of inventory with the Youth and Ecological Restoration Program (YER). YER provides one on one work experience, training and support for at risk youth under the age of nineteen (YER 2011). Through restoring local watersheds with community members youth gain a sense of worth, belonging and place. The focus of YER, Phase I is to work with one youth conducting ecological restoration activities with a variety of environmental organizations; YER, Phase II has two youth and two adults concentrating on a specific project to further develop teamwork, research techniques and communication skills.

The four ecological inventory contributors were YER coordinator, Wendy Kotilla; Registered Professional Biologist, Ian Moul; and two youth participants who wish to remain anonymous. Funding for Wendy Kotilla and the youth was provided by Ministry of Children and Family Development. Funding for Ian Moul was provided by Millard Piercy Watershed Stewards. This is a citizen science project with a goal of using scientific methods in ways that are interesting to the youth, helping them gain a more in-depth understanding of what makes up a functioning ecosystem and at the same are rigorous enough to be considered as a reconnaissance level scientific understanding of the site.

YER has conducted previous work within the Millard and Piercy watersheds and in the present study site. YER, Phase I work includes: invasive species removal, planting native plant species, water quality monitoring, monitoring downstream fish migration, conducting adult spawner counts and fish population estimates. An earlier YER, Phase II project was carried out in 2008 to monitor the productivity of fish rearing habitat in the Millard Creek side channel.

B Location

The study site is located along Minto Road in the upper headwaters of Millard Creek, in Electoral Area A of the Comox Valley Regional District (Map 1). The study site is made up of two properties, one owned by Wendy Kotilla at 4327 Minto Road is 1 acre and the second, owned by Sue Minchin at 4333 Minto Road is 10 acres (Map 2). Access to the study site was through Wendy Kotilla's property along a series of trails. The site is not open to the public.

C Methods

Before visiting the study site, aerial photographs, Sensitive Ecosystems Inventory (SEI) maps[1], and Conservation Data Centre (CDC)[2] occurrence and 'listed' species reports were viewed to gain a basic understanding of the site layout and conservation features.

[1] The Sensitive Ecosystems Inventory (SEI) was a joint Environment Canada. Ministry of Environment Lands and Parks initiative that used airphotos to identify sensitive areas in the Comox Valley (SEI 1998).

The ecosystem inventory method used in this study was an abbreviated form of the Biogeoclimatic Ecosystem Classification described in MOELP (1998) and Green and Klinka (1994). A true Biogeoclimatic Ecosystem Classification requires the examination of soils and an inventory of plants. Soil analysis was not practical during this study.

Two 20m by 20m study plots were measured on the ground and marked with flagging tape (Map 3). Plant species within each study plot were inventoried and scored based on relative abundance in each of the forest layers of: Moss/Lichen; Herb; Shrub; and Tree. On day one we assigned relative percentages based on looking at the study plot and the various plants (Appendix 1). On day two we refined our method by actually plotting major vegetation on graph paper maps of the study plot (Appendix 2). On both days we worked together to count the trees and develop relative percentages of vegetation through discussion that resulted in a general consensus of what we were seeing.

The main watercourses were mapped on day three using a hip-chain and compass bearings.

Locations of specific features such as one corner of the study plots, some of the trail/watercourse crossing, and the trail routes were identified using a Garmin 60Cx hand held GPS and presented on the Maps. As part of the objective of the YER is working "hands on'' in the natural world, the use of computers and GPS was kept to a minimum. Selected features were photographed and documented with the goal being a general overview of the study site and its characteristics. Flora and fauna were noted when encountered, though not systematically catalogued. As this was private land, much effort was made to stay on trails and not disturb the vegetation.

II ECOSYSTEM CHARACTERISTICS

A Overview

The underlying geological base material of the study site is Upper Cretaceous, Nanaimo Group undivided sedimentary rock, (BCGS 2011). The overall topography is level with a gentle rise to the west. Soils are high in organic matter with traces of sand in some beds of the watercourses. The two properties of the study and all surrounding properties are within the Agricultural Land Reserve (ALR 2011)

The south boundary of the study site is a private residential property used as an automobile body repair shop. The east and north-east boundaries are agricultural fields. The north-west boundary is Minto Road. The west boundary is residential gardens of Wendy Kotilla and Sue Minchin.

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[2] Conservation Data Center (CDC) develops and maintains a provincial listing of BC's most vulnerable vertebrate animals, vascular plants and ecological communities. Red listed includes species that are extirpated, endangered, or threatened in B.C. and Blue listed includes species that are vulnerable in B.C.

The original forest appears to have been logged in the early 1900s. Either at this time or later the fields to the east were cleared. A few red cedar were selectively removed approximately 30 years ago. Hedgerow growth along the ditch by the edge of the field suggests that the ditches have not been cleared in the past 25 years (Photograph 1). There are two water catchment areas on the site. Drainage from the north and central area is from a series of seeps and shallow overland flow collected by a ditch that flows north under Minto Road. The southern portion of the site drains to a ditch that flows east between two farm fields before flowing north and also under Minto Road.

B Ecological Description

The study site is located in the Georgia Depression Ecoprovince, and under the Biogeoclimatic Ecosystem Classification System, is classified as Coastal Western Hemlock – very dry maritime (CWHxm1)(Demarchi 1996).

Ecological descriptions of forest lands include both Forest Structural Stage Classifications and site specific soil and moisture regimes leading to mature forest plant community groupings, called Site Series. Our plant inventory data is shown in Appendix 1. Maps of plants in Study Site 2 are shown in Appendix 2. Photographs of Study Plot 1 and 2 are shown in Photographs 2 and 3. By considering the vegetation mix at each of the two study sites and noting that each site represents a young maturing forest we conclude that this area is made up of two plant community site series:

Site Series CWHxm1/07 Western redcedar / three leaved foamflower Very Dry Maritime
Rich to very rich soil nutrients; soil moisture is provided by both precipitation and seepage. The soil remains moist to very moist for most of the year. This site series is Red listed by the CDC and considered endangered, or threatened in B.C. (CDC 2011).

Site Series CWHxm1/12 Western redcedar – Sitka spruce / skunk cabbage
Medium to very rich soil nutrients; soil moisture is derived primarily from seepage and these areas will remain wet throughout the year. This site series is Blue listed by the CDC and considered vulnerable in B.C. (CDC 2011).

The CDC lists forest plant communities as either Red or Blue, based on the vegetation that might occur in large areas of late serial and mature climax forests. Given the relatively small size of the forest and the nearby edge effect of the roadways, residential properties, and fields there are no forest patches on the property that are large enough to be true examples of mature forest as defined by the CDC. While this forest may not fit the CDC definitions this does not mean this forest is not highly significant in the local context of the source of two tributaries in the Millard Creek watershed.

In addition to the regional scale classification of forest plant communities, the CDC keeps a registry of known rare plants. At this time, the study area has not been systematically surveyed for rare plant species and there were no CDC mapped occurrences reports. A CDC Ecosystem Explorer search (CDC 2011) produced a list of animal species potentially supported by habitat found on the Property (Table 1).

Table 1: The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and Provincially listed species that may potentially occur or be supported by habitat on this study site.

Common Name	Scientific Name	COSEWIC[A]	BC[B]
Fish			
Cutthroat Trout	*Oncorhynchus clarkii clarkii*		Blue
Reptiles and amphibians			
Red-legged frog	*Rana aurora*	SC	Blue
Birds			
Great blue heron (fannini subsp.)	*Ardea herodias fannini*	SC	Blue
Green heron	*Butorides virescens*		Blue
Band-tailed Pigeon	*Patagioenas fasciata*		Blue
Western screech-owl (kennicotti subsp.)	*Megascops kennicottii kennicottii*		Blue
Barn Swallow	*Hirundo rustica*		Blue
Mammals			
Keen's Myotis	*Myotis Keenii*		Blue

[A] COSEWIC listings: SC= special concern.
[B] Provincial listings: Red = indigenous species or subspecies extirpated, endangered or threatened in B.C.; Blue = species or subspecies considered to be vulnerable in B.C.

During the study we did not systematically inventory animal species but noted their presence when encountered. We observed deer tacks and places where deer had bedded down and avoided disturbance to these areas. We observed Turkey Vultures over a nearby field, as well as seeing hearing the calls of about three Red-Tailed Hawk. We heard Tree Frogs and located a salamander under an abandoned fuel tank. Wendy noted the occurrence of black bear and cougar in the area, and observations of mink and raccoon. We discussed how a small cedar grove within the forest adjacent to Minto Road had supported a colony of eleven pairs of Great Blue Herons from 2006 to 2008 (WiTS 2011).

There are no identified Sensitive Ecosystem Inventory polygons on the study site (SEI 2004). As with the CDC inventories mentioned above, the lack of SEI designated polygons is more a statement on the effort made to identify habitat, where smaller sites were not considered. Further downstream along Millard Creek SEI polygons identify areas designated as Pole/ Sapling > 10m tall and Young Forest <80 years. This concurs with the finding of this study.

C Invasive Plants

The Invasive Plant Council of BC defines the term "invasive plant" as any invasive alien plant species that has the potential to pose undesirable or detrimental impacts on humans, animals or ecosystems (IPC 2011). The most immediately visible detrimental impact is the competition with local native plant species. More subtle and insidious impacts are where invasive plants can upset the nutrient balance and have long term impacts on the soil chemistry and insect communities that support the larger more visible plant and animal communities.

We did not make a systematic search for invasive plants. We noticed patches of Himalayan blackberry on the site perimeter. We observed specimens of English holly in the interior of the forest. We discussed the general issues around invasive plants. Wendy pointed out places where previous Youth and Ecological Restoration participants had removed English holly.

D Wildlife Trees and Coarse Woody Debris

Fenger *et al.* (2006) defines a wildlife tree as: any standing dead or living tree with special characteristics that provide vitally important habitat for the conservation or enhancement of wildlife. There is no one characteristic or rating system that defines the quality of wildlife trees within a given landscape. The habitat qualities offered by wildlife trees vary with each species of wildlife using the tree. A most important consideration when assessing the quality of wildlife trees is their location in terms of the surrounding forest or riparian habitat and the proximity to human disturbance. At a landscape level, the quality of wildlife habitat may be gauged by the density and distribution of a variety of tree species and age classes. Most tree species provide an increasing quality wildlife habitat after they are dead. A veteran western red cedar can provide valuable wildlife habitat for over 500 years after it is dead (Fenger *et al*. 2006). Other dead trees such as red alders provide important cavities for smaller birds, but will rot and are gone in 25 years. The life and death cycle of both coniferous and deciduous trees are classified based on bark retention and wood condition codes (MOEPL 1998).

In the Field Manual for Describing Terrestrial Ecosystems, (MOELP 1998), coarse woody debris (CWD) is defined as: dead woody material, in various stages of decomposition, located above the soil, larger than 7.5cm in diameter (or equivalent cross section) at the crossing point, which is not self supporting. CWD provides a feeding, breeding, and shelter substrate for many organisms (invertebrates, small mammals, amphibians) (Wildlife Tree Committee 2005). CWD also helps to increase riparian and aquatic habitat quality by stabilising stream banks, dispersing stream energy, and increasing channel complexity.

We did not make a systematic inventory of wildlife trees or coarse woody debris but pointed out and discussed examples as there were encountered. We noted woodpecker holes. We observed

ageing alder both standing and laying on the forest floor and discussed the nutrient cycles in the soil.

E Fish and Wildlife Characteristics

The watercourses on this site are a mix of naturalised ditches (Photograph 4) and natural channels. Many of the watercourses had flowing water and there were noticeable areas of natural seepage (Photograph 5). In some locations, in the driest month of the year, subsurface waterflow could be identified by wet soil and patches of skunk cabbage.

Map 2, provided by Project Watershed and the Mapping Centre shows how the mapped extent of the upper reaches of Millard Creek ends just at the edge of the study site. We used compass bearings and a hip chain to measure out and extend our knowledge of the watercourse position into the study site (Map 3). There are a couple of short sections of visible water that later disappeared underground. These are indicated on Map 3 as ephemeral watercourses. In the time available for this project we were not able to fully map all the smaller sections of watercourse on this site.

Two available maps of the Millard Creek watershed differ slightly in how the two catchment areas on this study site eventually flow into Millard Creek. A map from the Millard/ Piercy Watershed Management Plan 2001 suggests that flow from the north and central catchment ends up in North Millard Creek while the southern catchment ends up in South Millard Creek. North and South Millard Creek tributaries join approximately 1km downstream along Fraser Road. Map 2 presented here, also from 2001, shows how the two catchment areas may join in a ditch along the north side of Minto Road. Regardless of water flow downstream of Minto Road, the watercourses mapped during this study clearly demonstrate year-round waterflow entering the Millard Creek watershed (Photographs 4 and 5).

The watercourses as described above, while they may or may not be inhabited by fish, provide water, food and nutrients to known fish bearing waters immediately down-stream. Under the terms of both the Provincial Riparian Area Regulation (RAR 2011) and the Forest Practices Code (FPC 1995), these areas are considered as fish habitat. Any adjustments to the hydrology of watercourses, which include the alteration of bridges, culverts, and building dams, must be carried out under prescriptions developed by a Qualified Environmental Professional.

IV HUMAN ENGINEERED FEATURES

A Archaeological History

No evidence of prehistoric aboriginal presence was observed.

B Original Settlement

By looking at the stumps of red cedar trees from the original forest we may assume that this area was first logged in the early 1900s. Wrecked cars left at the site are from the 1940s and 1950s (Photograph 6). It may be assumed that the ditches were originally dug to drain the area of the agricultural fields. A pond located near the south-west boundary of the forest appears the result of fill being added on neighbouring land to the south.

C Current Conditions and Human Impact

This study site is private and personal place of sanctuary. The trails have been made with great care to have minimal impact on the forest and the watercourses. We observed numerous personal objects placed throughout the forest. We discussed the importance of natural spaces in our wellbeing and how each in our own way will personalise where we live to enhance our bond with the natural world.

While making our ecological inventory we discussed the community planning issues facing small remnant forests in rural areas. We talked about the need for food and how agricultural lands can have both a beneficial and negative impact on forest, hedgerow and fish habitat. We considered how slow incremental residential growth puts pressure on patches of natural habitat. We talked about the old cars, noted how the mosses and other plants had grown around them, but wondered if there was still fuel or oils that could contaminate the site. We discussed how land use and environmental impact can cumulatively change when a residential home business slowly grows into an industrial area in an environmentally sensitive location.

V DISCUSSION

The fourth day of this five day program was devoted to preparing the youth participants to deliver a public tour of the study site. The tour aspect of this work is very important as it allows the youth participants to draw from the scientific work and our discussions and to make it “real” by sharing it with a group of people that may or may not have an ecological understanding of the area.

As facilitators in this Youth and Ecological Restoration Program our goal was to help the youth participants gain an appreciation of the components within the local landscape. Our success in this program may be gauged by the youth participant’s ability to find this interesting and to be able to express their interest during the tour.

Future concerns for this site, and for the entire upper Millard Creek watershed are incremental loss and degradation of natural habitat. A report by the David Suzuki Foundation (Campbell

2006) describes a ripple effect whereby non-agricultural residential use of rural lands has led to speculation and rising land prices. The result is increased pressure to convert rural lands into suburban subdivisions. Between the start of the Agricultural Land Commission in 1973 and the preparation of the Campbell (2006) report, on (*southern*) Vancouver Island 86.8% of lands designated as Agricultural Land Reserve have been removed. Without careful land planning, the same trend may be expected in the Comox Valley.

As it becomes less cost effective to farm there are less resources available to support sensitive ecosystems, patch woodlands and riparian areas on agricultural lands. Our ecological inventory on this patch forest in the upper headwaters of Millard Creek documents red and blue listed plant communities, and identifies spring fed waterflows for downsteam fish populations. As a small, but intact ecosystem this area provides natural habitat for many terrestrial species that live in the forest, as well as a wildlife corridor and upstream habitat for aquatic species.

Considering the dual objectives of conducting an inventory of the study site and involving youth participants to learn more about the natural world, this project was a success. The two youth learned how to do a forest inventory by naming and mapping its contents; they totally engaged and educated the fifteen tour members; and effectively passed on the knowledge they gained. The reason why we do this work comes from a deeper place within ourselves that is eloquently captured in this Mauri Proverb:

> *"We must protect the forests for our children, grandchildren and children yet to be born. We must protect the forests for those who can't speak for themselves, such as birds, animals, fish and trees"*

VI REFERENCES

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YER 2011. http://www.youthecology.ca/index.html

ECOSYSTEM FIELD FORM Study Site 1	Day: 8	Month: August	Year: 2011
Surveyor(s): Tammy Schumacker, Harley Steggles, Wendy Kotilla, and Ian Moul			

SITE DESCRIPTION			
General Location: Forest east of Wendy Kotilla's property at 4327 Minto Road			
SW corner of plot Coordinates	UTM Zone: 10	Easting: 355759	Northing: 55500746
Succession Status: Maturing Serial of between 60 to 100 years with some young trees			
Structural Stage: Young Forest, self thinning where the forest canopy has begun to differentiate into distinct layers			
Substrate (%)	Organic Matter: 95	Rocks: 0	Decomposing wood: 5
	Mineral Soil: 0	Bedrock: 0	Water: 0
Notes: With thick vegetation and canopy cover the GPS accuracy we had was +/- 10m. We located one cedar in a protective cone. Wendy noted that previous Youth and Ecological Restoration teams have removed English Holly from this area and planted some trees. We discussed how plant communities grow from soils based on the amount of available water and the nutrients in the soil. This site appears to be very moist and made up of a thick layer of rich organic soils. Immediately east of the study plot were one each of a mature black cottonwood, Sitka spruce and a western hemlock.			

VEGETATION Note: Non-vegetated organic soil at 10%				
% cover by Layer	Tree: 17	Shrub: 40	Herb: 30	Moss/Lichen: 3

TREES	A1	A2	A3	**A**	B1	B2	**B**
cedar	3	2	1	**6**	1		**1**
alder	6			**6**			
maple	4			**4**			
mountain ash			1	**1**			
cascara		1		**1**			
dogwood						1	**1**

ECOSYSTEM FIELD FORM - Page 2 – Study Site 1

SHRUB LAYER	% based on shrub layer percentage
salmonberry	30
false azalea	4
red huckleberry	1
elderberry	4
trailing blackberry	1
Total	40

HERB LAYER	% based on herb layer percentage
skunk cabbage	6
sedge	18
lady fern	3
foamflower	Trace
sword fern	Trace
deer fern	Trace
false lily of the valley	3
Total	30

MENSURATION			
Tree #	**Species**	**DBH**	**Height**

ECOSYSTEM FIELD FORM Study Site 2	Day: 9	Month: August	Year: 2011
Surveyor(s): Tammy Schumacker, Harley Steggles, Wendy Kotilla, and Ian Moul			

SITE DESCRIPTION			
General Location: Forest south and east of Wendy Kotilla's property at 4327 Minto Road			
Centre of plot Coordinates	UTM Zone: 10	Easting: 355846	Northing: 55500664
Succession Status: Maturing Serial of between 60 to 100 years with some young trees			
Structural Stage: Young Forest, self thinning where the forest canopy has begun to differentiate into distinct layers			
Substrate (%)	Organic Matter:	Rocks:	Decomposing wood:
	Mineral Soil:	Bedrock:	Water:
Notes: With thick vegetation and canopy cover the GPS accuracy we had was +/- 10m.			

VEGETATION Note: Non-vegetated organic soil at 25%				
% cover by Layer	Tree: 5	Shrub: 30	Herb: 25	Moss/Lichen: 10

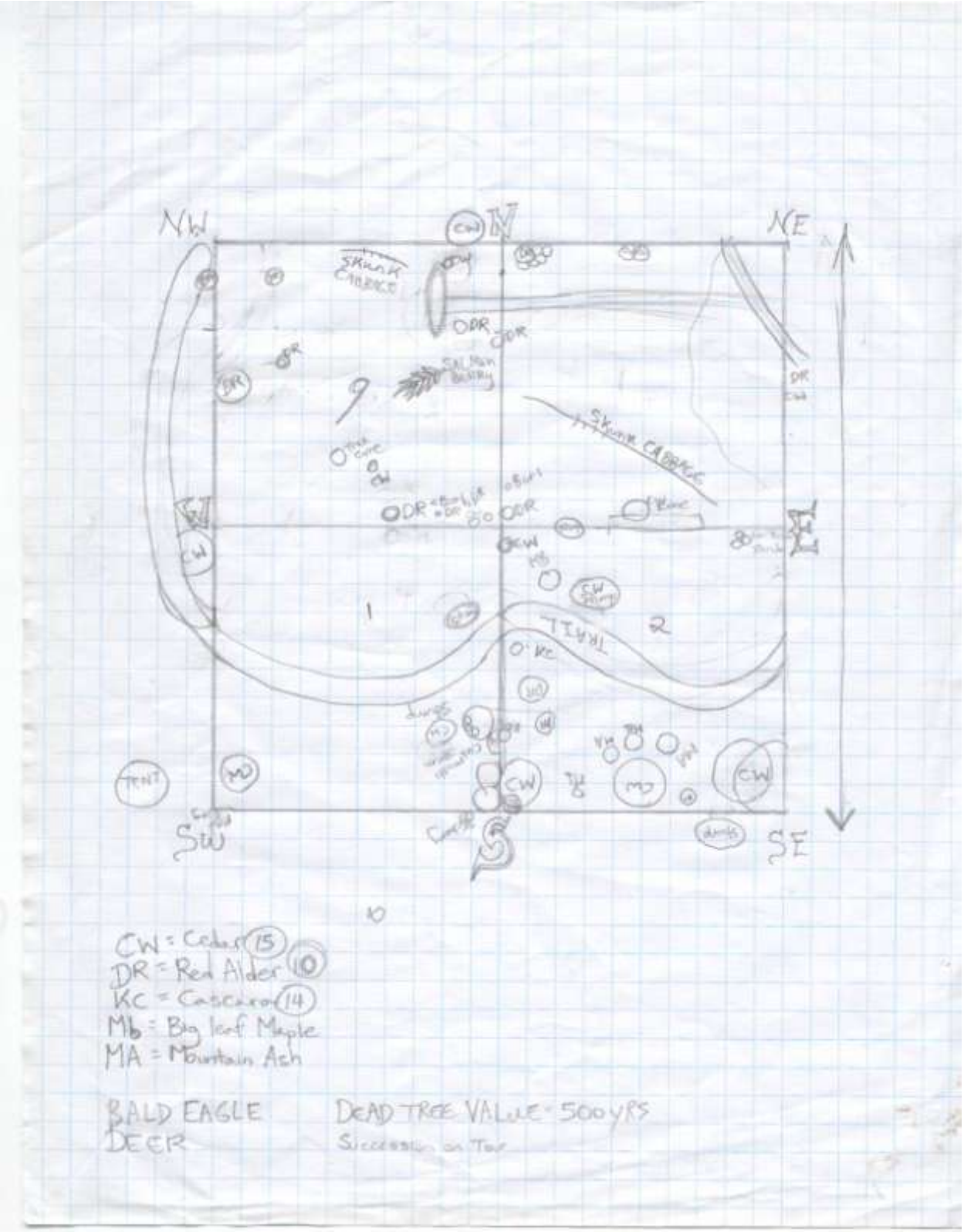
TREES	A1	A2	A3	**A**	B1	B2	**B**
cedar	7	2	3	**12**	3		**3**
alder	12			**12**			
maple		1		**1**	4		**4**
mountain ash			1	**1**	1		**1**
cascara					14		**14**
						1	**1**

ECOSYSTEM FIELD FORM - Page 2 – Study Site 2

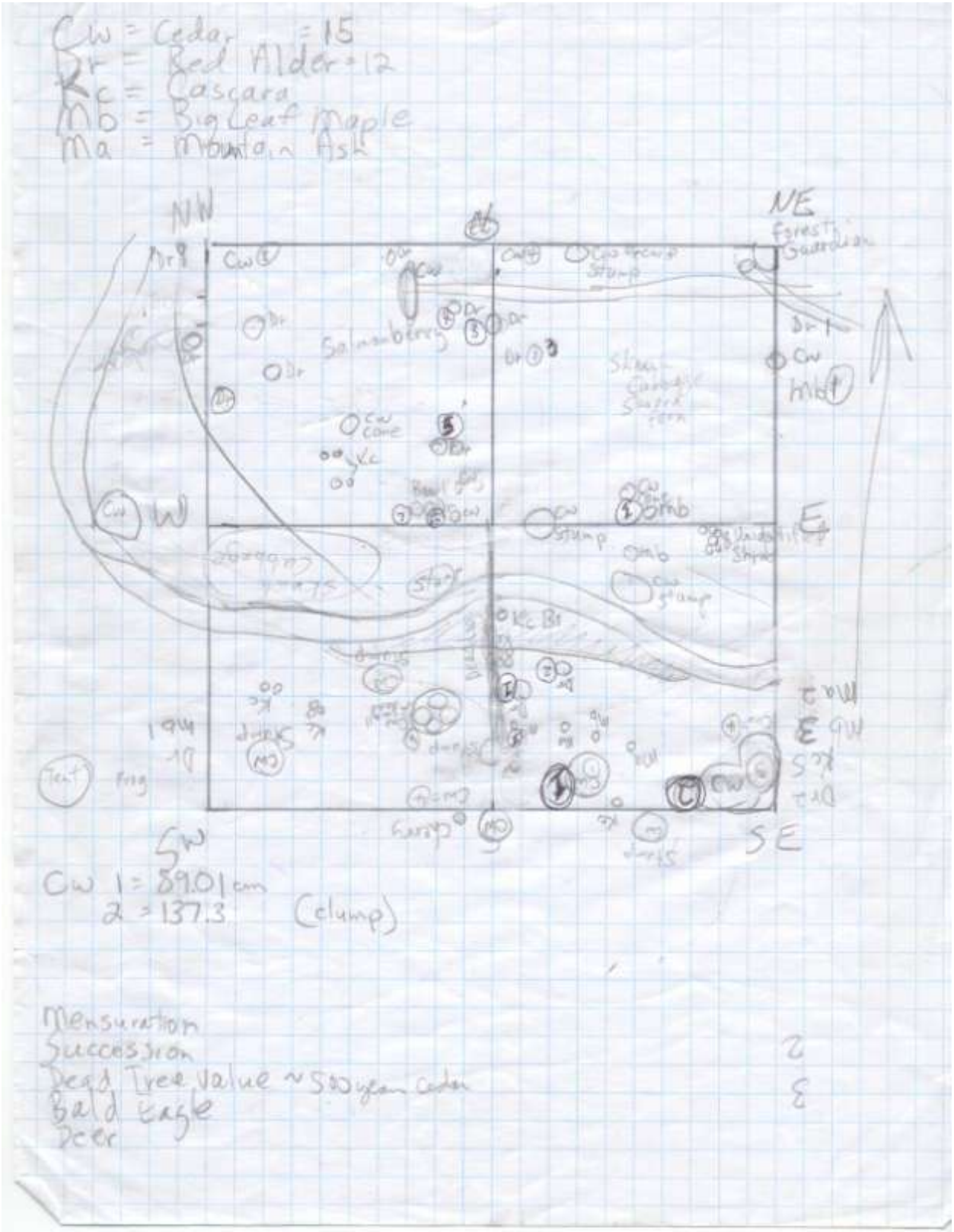
SHRUB LAYER	% based on shrub layer percentage
salmonberry	25
cascara	5
red huckleberry	Trace
Total	30

HERB LAYER	% based on herb layer percentage
skunk cabbage	6
lady fern	6
sword fern	6
salmonberry	3
false lily of the valley	4
dovefoot geranium	Trace
Total	25

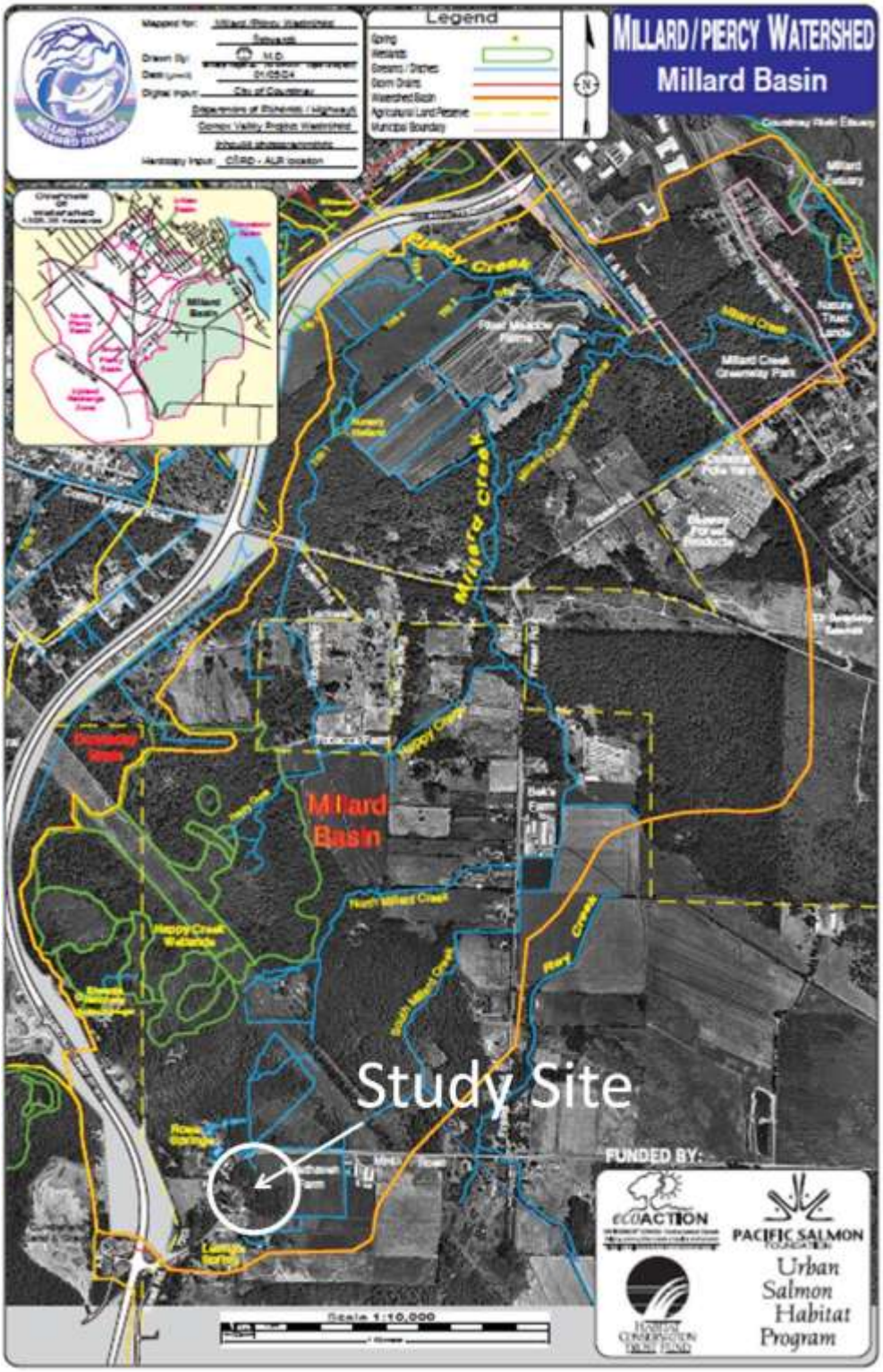
MENSURATION		
Tree #	**Species**	**DBH**
C1	cedar	89 cm
C2	cedar	137 cm
A1	alder	25 cm
A2	alder	11 cm
A3	alder	23 cm
A4	alder	20 cm
A5	alder	20 cm
A6	alder	26 cm
A7	alder	27 cm
M1	maple	16 cm
MA1	mountain ash	6cm



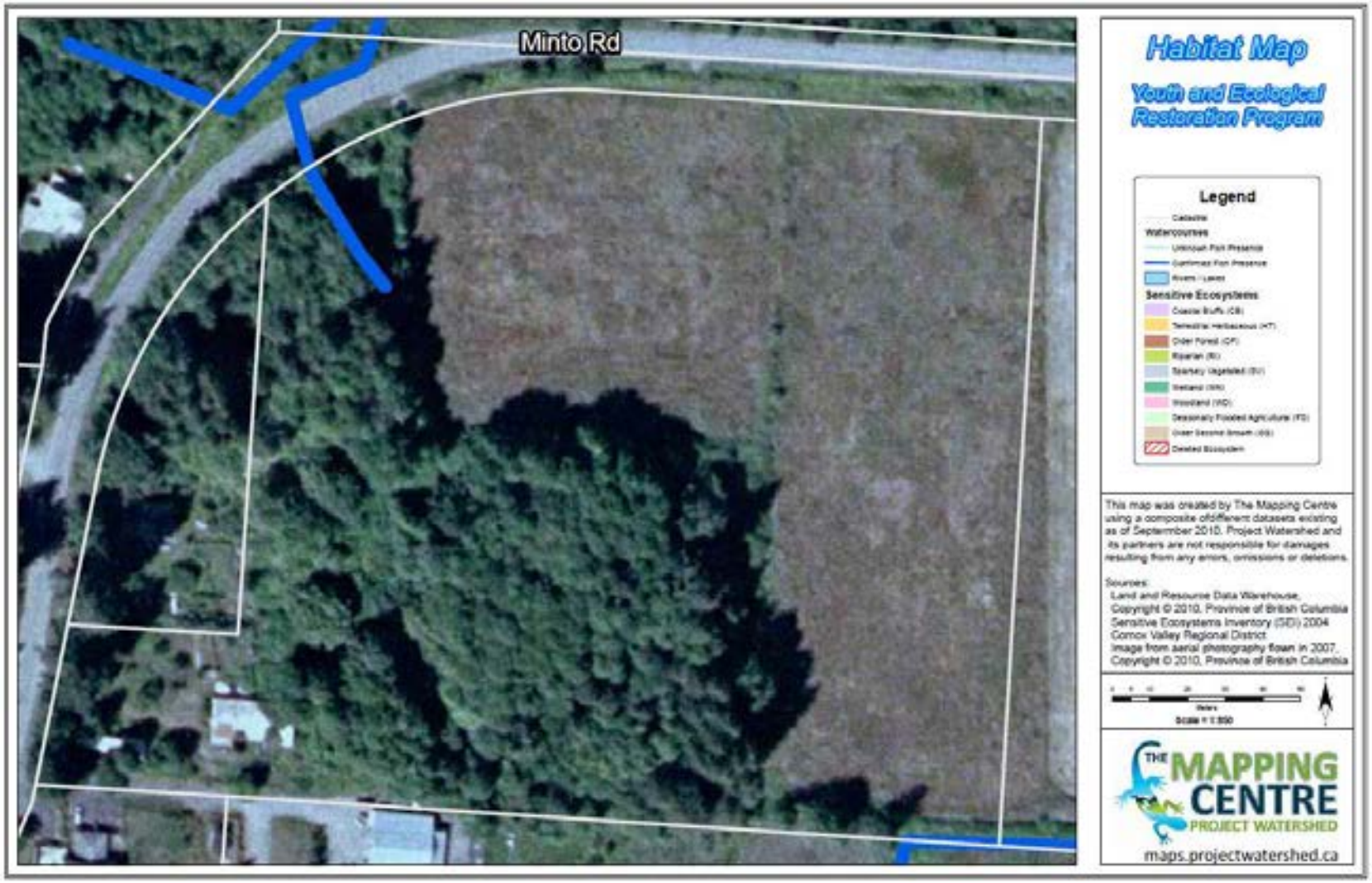
Vegetation map for Study Plot 2 - Example 1



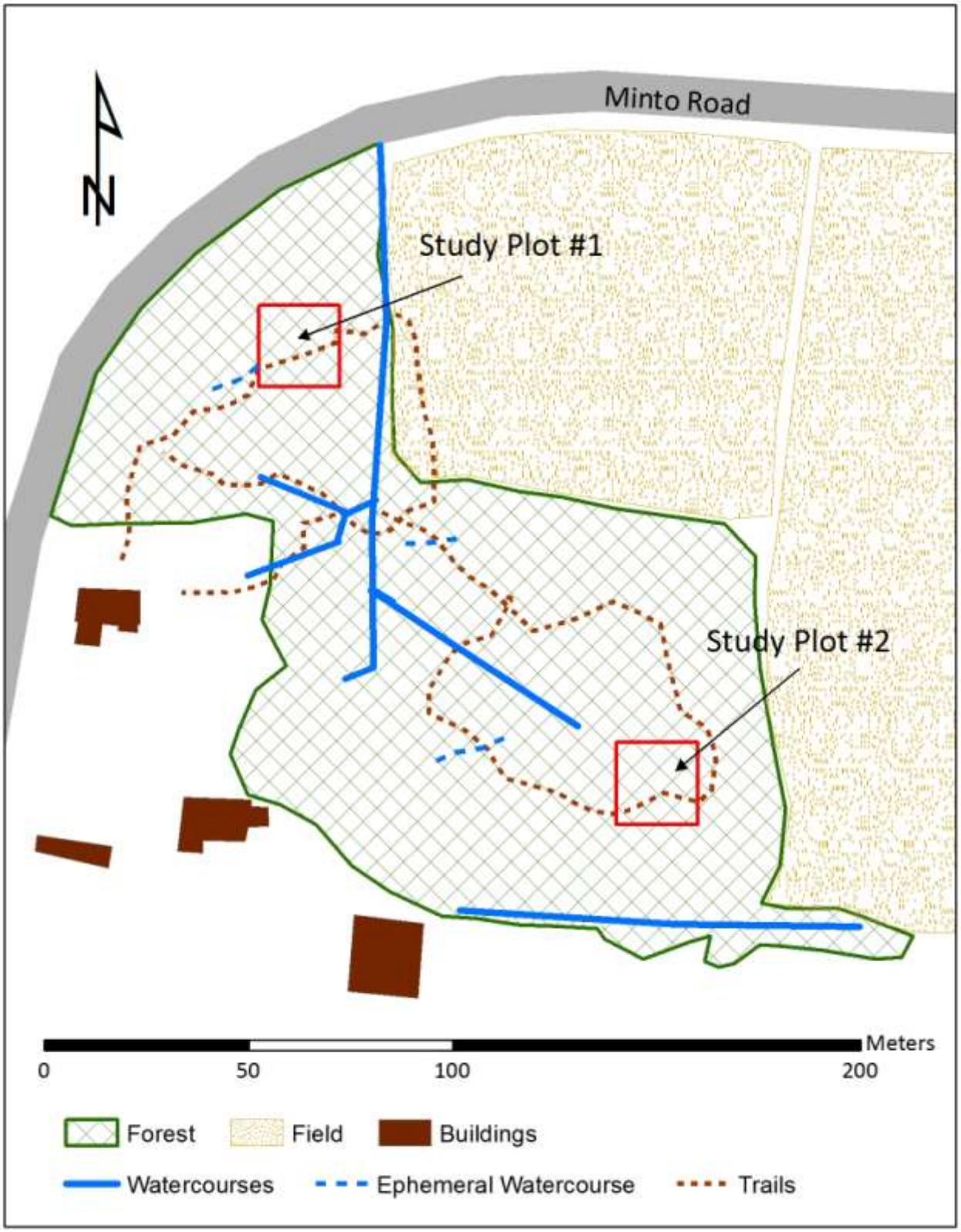
Vegetation map for Study Plot 2 - Example 2



Map 1: The South Millard Creek Headwaters Study Site in relation to the Millard Creek Watershed.



Map 2: An aerial view of the study area showing watercourse locations in the Project Watershed map files.



Map 2: Location of Study Plots within the South Millard Creek Headwaters Study Site

Photograph 1: Edge of field and hedgerow looking north towards Minto Road.

Photograph 2: Study Plot 1, looking north.

Photograph 3: Study Plot 2, looking north.

Photograph 4: View looking south along a naturalised ditch.

Photograph 5: Natural seepage and water flow along a section of ditch. Note the sand on the bottom of the watercourse channel.

Photograph 6: Old cars found on the site

Photograph 7: A white plastic tree cone used to protect young trees from the deer, and a an example of personalisation of the forest area.