Ecological Restoration Plan and Management Recommendations for Kanishay Park in North Saanich, BC

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Abstract:

Kanishay Park in North Saanich, BC is prone to thickets of invasive Common Hawthorn (*Crataegus monogyna*), Cutleaf Blackberry (*Rubus laciniatus*), and English Ivy (*Hedera helix*) among other things. The thickets of shrubby trees are causing a lack of structural diversity, native conifers are unable to reach expected heights and the shade caused by the thickets has led to bare ground in many areas. In fall of 2023, a work party cleared a test restoration site within the park. Based on the amount cleared by this work party, it is estimated that clearing of the entire degraded area of the park will take between 360 and 476 hours. Once the test restoration area was cleared, it was planted with 3 native conifer species, *Abies grandis*, *Pseudotsuga menziesii*, and *Pinus monticola*, as well as native shrubs *Gaultheria shallon*, and *Polystichum munitum.* These plants will be monitored to determine which species can survive best in the site's conditions and should be planted throughout once the thickets and invasive species are removed. This restoration plan is intended as a guide for Friends of North Saanich Parks to hopefully continue the work that has been started there. Monitoring suggestions have also been included and involve continuous invasive species removal and trimming of native shrubs to allow space for planted conifers to grow.

Acknowledgements

First of all, I would like to acknowledge the W̱SÁNEĆ peoples, whose traditional land Kanishay Park falls upon and whose historical relationships with this land continue to this day.

This project would not have been possible without the help from Anne Zerrath and Sharon Hope. These ladies introduced me to the project site and all the issues that come along with it. They are fearlessly restoring parks throughout North Saanich and I was lucky to have been able to contribute some time to one of the many parks in their roster. They are a part of the group Friends of North Saanich Parks who came out for a workday and helped to clear thickets in my restoration test site. I would also like to give a huge thankyou to all of the volunteers that came out that day and any volunteers that will help restore Kanishay Park in the future. It has a long way to go but after seeing the willingness and capabilities of that group's members, I have no doubt they will be able to accomplish something amazing!

I would also like to thank Nancy Shackelford for getting me started on this project and helping to guide me along the way. You have been an important source of expertise when it comes to this project.

Lastly, I would like to thank the University of Victoria Foundation for the Dr. Lorene Kennedy Environmental Studies Undergraduate Award. This money helped to pay for the supplies and plants for this restoration project and allowed me to travel back and forth to the restoration site regularly to complete the project.

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1.0 Introduction and Objectives

This report is serving as a restoration plan for Friends of North Saanich Park (FNSP) to complete a restoration of Kanishay Park. Friends of North Saanich Parks is a non-profit society and charity that has been operating since 2016. For this project on Kanishay Park I have been working most closely with Sharon Hope, co-founder of FNSP, and Anne Zerrath, the executive director. It is a volunteer-based group that hosts invasive species removal events at parks throughout North Saanich, as well as native species planting events in order to restore the parks to their fullest potential. Kanishay Park will hopefully be added to their impressive roster of restoration projects, and the work explained in this report should act as a plan and guide for their future restoration efforts in Kanishay Park.

1.1 Location and Site Description

Kanishay Park is a forested park located in North Saanich, British Columbia (Figure 1) in the northern most part of the Saanich Peninsula on Southern Vancouver Island. This area is classified as a Coastal Douglas Fir Biogeoclimatic zone. It contains a walking path connecting Kanishay Road and Woodcreek Drive and is frequented by neighbours, dog walkers, and horseback riders. It is surrounded on all sides by roads, private residences, an equestrian stable, and empty vegetated strata lots. The park is 2.26 hectares in size, approximately 0.7 of those hectares is the main focus of this restoration. The history of the site is unknown, but the few apple trees in the area and within the park boundary, suggest that perhaps it was an orchard or farm at some point that was left behind when the land was divided up for residential housing properties. No matter the past, it is clear the site has been altered in some way and then left to grow out of control with thickets of Common Hawthorn (*Crataegus monogyna*). The Common Hawthorn tree is considered an introduced invasive species in British Columbia and is native to

Europe, and parts of Africa and Asia (Klinkenberg, 2020). The tree can continue to grow from root suckering, and since the use of power tools is prohibited in the park, we are unable to remove many of the larger stems and roots. This is another reason monitoring is going to be very important in the stand post-restoration.

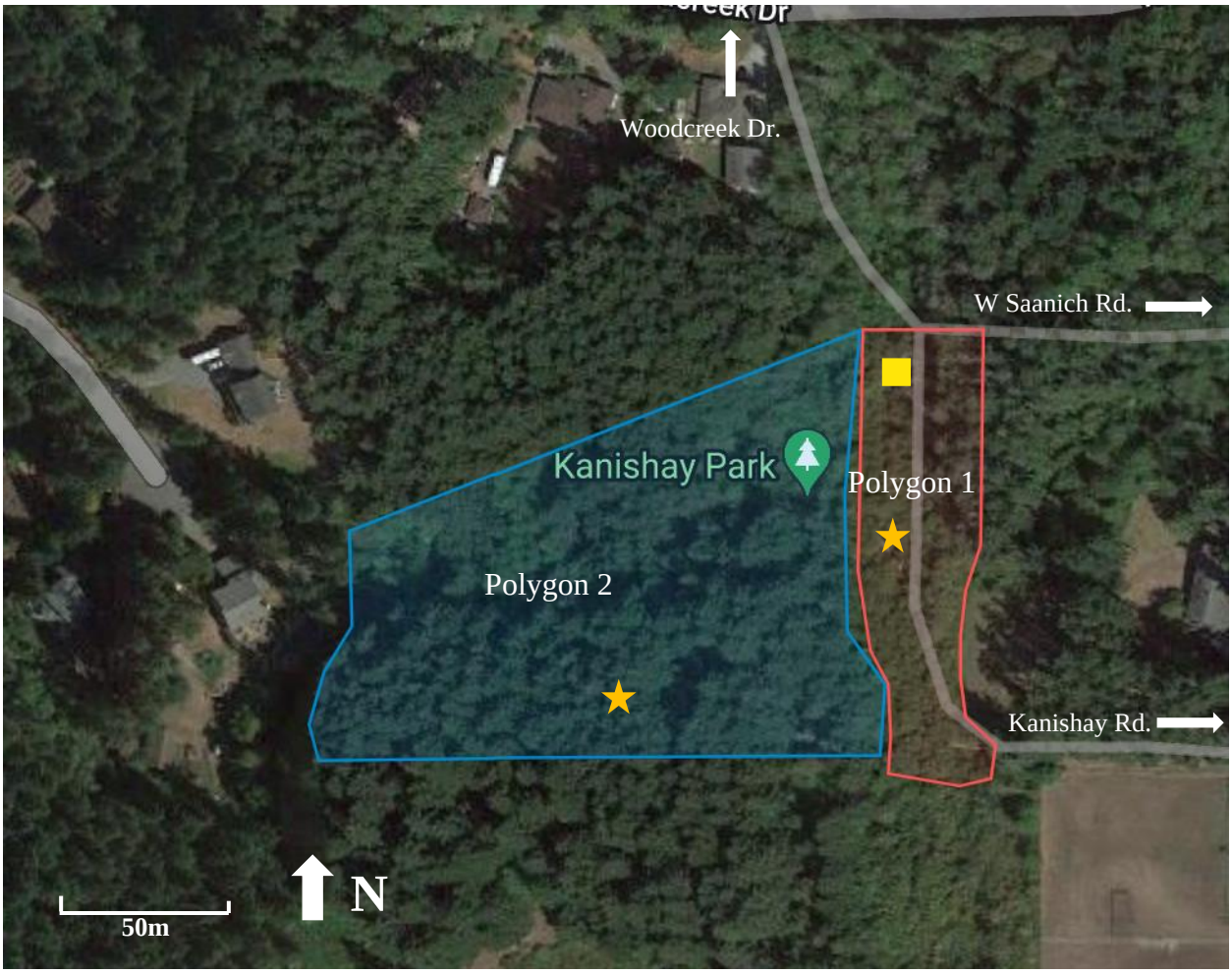

Figure 1. Map of Kanishay Park. The blue polygon is the conifer dominant mixed stand with an understory of salal. The red polygon is the main focus of this restoration, the Hawthorn dominant thickets with many invasive species and lack of ground cover. The yellow square is the 9x7m test restoration site that has been cleared and planted. The yellow stars are the sites of the soil pits and species surveys that were conducted in each polygon. The forested areas surrounding the polygons are privately owned lands.

The main issues in Kanishay park are within a window of approximately 15m on either side of the walking path that runs through it. The issues are caused by invasive species, especially thickets of invasive shrubby trees. These thickets have created extensive mats of tangled sticks, many of which are dead and pose a huge fire risk for the park and surrounding properties. The thickets suspend dead plant material and sticks, drying them out which increases the flammability of the area (Doran *et al.,* 2004). The thickets would act as kindling if a fire were to break out, posing a risk to neighbours and surrounding ecosystems. Another species found in the stand is the native species Black Hawthorn, these trees have been known to have a lot of small low branches that create ladder fuels for a fire to reach the crown of a forest (Habeck, 1991). Black Hawthorne trees were found in the test restoration site and were mainly found to be growing horizontally and diagonally with many thin stems, likely increasing the potential fire risk of the stand.

1.2 Vertical Structure for Wildlife

Many forest bird species require vertical structure as habitat to forage, nest, and breed (Adams *et al.*, 2014), something the restoration site in Kanishay Park is lacking. Due to the thickets, there is little to no ground cover and conifers are blocked from growing up to create a canopy. This area of the park predominantly has shrubby trees that reach an average height of about 6 metres. This is highly contrasted to the conifer dominant mixed stand making up the rest of the park (Figure 1). The conifer stand has a much more diverse vertical structure; ground cover and small shrubs, tall conifers creating the canopy and an intermittent layer of shrubby trees and taller deciduous trees that connect the ground and canopy layers. This is ideally the

type of structural diversity we will see in the rest of Kanishay Park in the long run from the results of the restoration.

1.3 Objectives

The objective of this restoration was to create a detailed site assessment and plan to restore the entire park. This was done by creating a small test area, where invasive species and thickets were removed to determine the best methods of removal. We then planted native species, both trees and shrubs, which will be monitored during the restoration of the rest of the park. We will be looking for survival rate of each species, given specific site conditions, and whether or not the canopy of thickets was cleared enough to provide space for the trees to grow without crowding. The test site also gives us a time frame of how long the entire park will take to restore. We will also be monitoring the site for invasive species return to determine what level of monitoring may be needed in the park after the entire restoration is completed.

2.0 Methods

2.1 TEM and Site Series:

A map was used in conjunction with ground observations to broadly identify different ecosystem types within Kanishay Park, to determine the number of polygons. Once these differences were determined I walked through each of the projected polygon areas to ensure uniformity throughout that area of the park and check for any changes in forest composition within the projected areas which could indicate a need for a different polygon and site series assessment. I then performed a ground inspection survey in each of the projected polygon areas. The ground inspection survey consisted of marking a 20m-by-20m plot area (one in each

polygon) to conduct the survey within. In the center of the plot, I dug a soil pit, approximately 60cm deep and then used the soil moisture regime and soil nutrient regime keys found within Land Management Handbook No. 28 titled "A Field Guide for Site Identification and Interpretation for the Vancouver Forest Region" to assess the soil found in the plot (Green & Klinka, 1994). In each of the plots I also made note of all species present and their % ground cover within the 20 m^2 plot. The polygon that is the focus of this restoration is polygon 1, and the conifer dominant mixed stand is polygon 2 (Figure 1).

2.2 Wildlife Survey:

I walked through the site and looked for trees that appeared to be dead, decaying, or have some evidence of wildlife use. I was searching for nests, dead trees, bracket fungi, lichen, broken bark, woodpecker holes, and sapsucker holes, etc. When I located a potential wildlife tree, I measured the diameter breast height and noted other aspects of the tree such as species, whether it was standing or fallen, broken top, % bark remaining, height to live crown, and I gave the tree a score for each of 6 wildlife codes. These wildlife codes that the tree was being scored on were appearance, crown, bark, wood, lichen, and wildlife use. These were standardized in section 4.3 of the "Vegetation Resources Inventory – British Columbia Ground Sampling Procedures" from March 2018 which details assessing tree attributes for wildlife (Ministry of Forests, Lands and Natural Resource Operations, 2018). I also used the Merlin Bird id application by Cornell lab, an app which identifies birds based on their songs. I used this app to record bird calls for 2 minutes on the morning of October 14th, 2023, when standing in the restoration test area. This was 2 weeks after the restoration work party, which removed many thickets from this area.

2.3 Invasives and Thickets Clearing:

We held one workday in October of this fall, 6 people were working together to remove thickets and invasives for 3 hours. The specific site location we worked on is shown in figure 1. We worked from the trail inwards to give us access as we went. The tools used included hand saws, large loppers, and secateurs. We used the tools to trim the thickets and larger material and then remove the material bit by bit. We cut up the sticks into smaller pieces and used our feet and the loppers to crush them on the ground as much as possible. Any invasive plant material with fruits present and English Ivy was removed from the site, as well as some small and green plant material that was not easily broken down, we removed a pile of plant material that was approximately 13.4m^3 in size. Any larger material that could be considered coarse woody debris was ensured to be left behind to maintain moisture in the stand and create microsites for planting. The invasive blackberry was trimmed back, and shovels were used to dig up the root ball and remove it. Excess plant material was removed by the city, this was organized by Friends of North Saanich parks. I recommend wearing sturdy leather gloves because the rose bushes, hawthorn, and blackberry are all very thorny.

We also ended up having to remove a fair amount of Nootka Rose, since this is a native species, we tried to leave as much as possible but because they were growing through the Hawthorn thickets, many of the stems were growing horizontally and were adding to the thickets. Any rose plants adding to the thickets or that could impede the upward growth of a planted conifer were removed. Any rose bushes or stems on a particular bush that were growing upwards or didn't seem to be an issue were left alone. All of the stems and rosehips were placed on the ground in the stand and will hopefully add to the seed bank so more rose bushes can grow in the future.

2.4 Planting regime:

I planted 6 trees in total from 3 species, and 6 shrubs from 2 species in the 9x7m plot cleared by the work crew (table 1). Date of planting was November 16th, 2023. I attempted to have some individuals of each species planted in different microsite conditions. The test restoration area is 9x7m with 2 separate areas of standing water, each approximately 1m in diameter (Figure2). Plants planted closer to these areas were in slightly moister microsites and plants planted away from these areas were planted in slightly drier microsites, but still very moist. The main difference visually was how rapidly the hole dug to place the plant in was filling with water (the moister site holes rapidly filled entirely with water). It is important to note that upon my first visit to this site in August of 2023 I did not witness any standing water in the park.

Table 1. below is a list of the species planted in the restoration test site and where they were sourced from.

Species	# Of plants planted	Source	comments
Douglas Fir (*Pseudotsuga menziesii*)	3	Russell Nursery and Facebook Marketplace	1 tree from Russell Nursery, approximately 80cm tall when planted. 2 trees purchased from FB, ~30cm height each when planted.
Western White pine (*Pinus monticola*)	2	Unknown	Received from Anne Zerrath, unknown source. Approximately 50cm tall when planted.
Grand Fir (*Abies grandis*)	1	Restoration site	Already present in site, relocated from directly beside a larger tree where it would not have been able to grow due to crowding. Approximately 30cm height when transplanted.
Salal (*Gaultheria shallon*)	3	Russell Nursery	Each in 1-gallon pots
Western sword fern (*Polystichum munitum*)	3	Russel Nursery	Each in 1-gallon pots

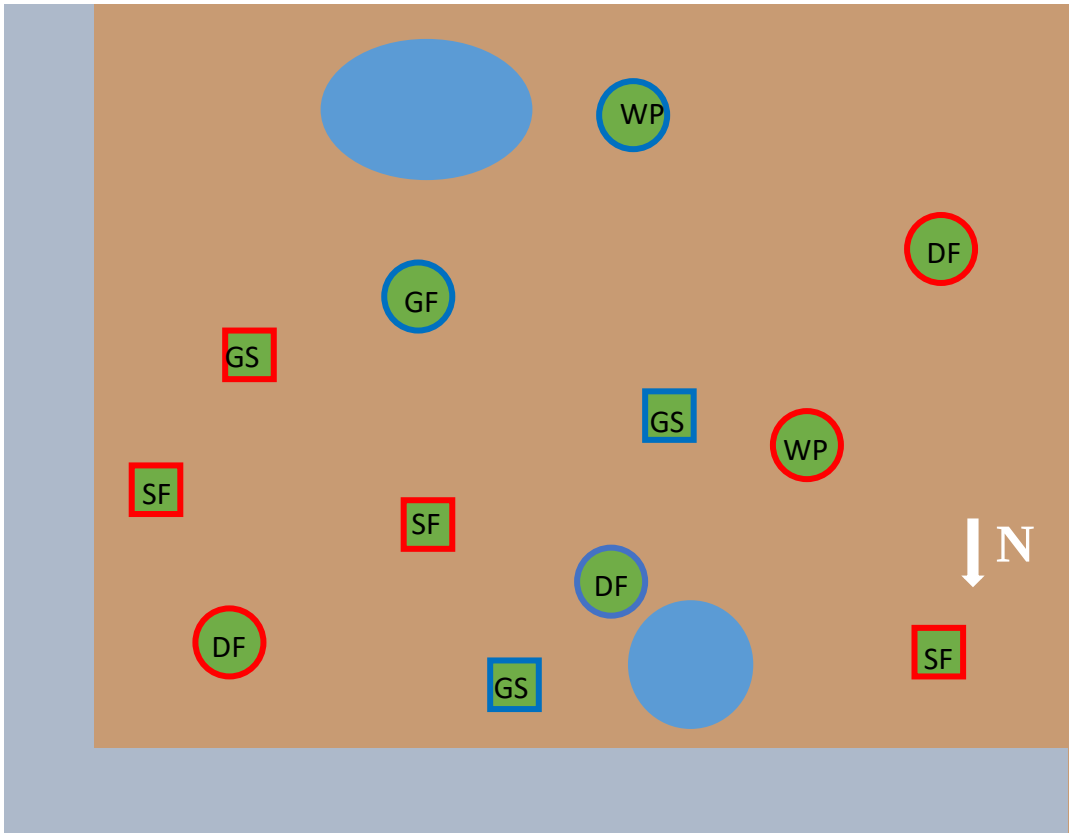

Figure 2 shows where each species was planted in the restoration test site (legend below). The grey along the edge is the walking path. Circles indicate trees and squares indicate shrubs. Red outlines indicate that the specific plant was planted in a slightly drier site and the blue outlines indicate that the plant was planted in a slightly moister site. The larger blue circles indicate standing water.

DF: Douglas Fir (*Pseudotsuga menziesii*)

SF: Western Sword Fern (*Polystichum munitum*)

GF: Grand Fir (*Abies grandis*)

WP: Western White Pine (*Pinus monticola*)

GS: Salal (*Gaultheria shallon*)

3.0 Results:

3.1 Site Series

The soil pit dug in polygon 1 showed a 25cm thick moist and rich organic soil layer with a mineral layer below that was primarily clay (images of soil pits on appendix B). There were very few plants making up the ground cover in this plot, and a small amount of undecomposed deciduous leaf material was seen on top of the organic soil. This indicates that the organic material is primarily made up of deciduous leaf material which is to be expected since it is a mixed stand that is dominated by deciduous trees including the non-native Common Hawthorn trees (*Crataegus monogyna*). This polygon was determined to be a site series 6, FwBg – foamflower.

This is very different than what was found in polygon 2, the conifer dominant mixed stand. In polygon 2, the soil was much drier with a shallower organic soil layer, approximately 10-15cm thick, that was also lighter in colour, although this colour difference could be due to moisture levels in the soil. The plant material on top was not as well decomposed and was comprised mostly of conifer needles, due to the fact that although this is also a mixed stand, it is dominated by Grand Fir (*Abies grandis*) and Douglas Fir (*Pseudotsuga menziesii*). The mineral layer was made up of sand and gravel. This polygon was determined to be a site series 1, FD – salal.

Table 2. summarizes the results from the ground inspection surveys performed in each plot.

Polygon #	Plot location	aspect	elevation	slope	SMR	SNR	Crown closure	BGC unit	Site series
1	48.6924, -123.4630	east	41 m	1%	5	E	35%	CDFmm	06
2	48.6917, -123.4639	west	40 m	13.6%	2	C	75%	CDFmm	01

3.2 Vegetation Survey

Table 3. The % cover of native and invasive species of each structural layer in the $20m^2$ plot in polygon 2.

	Tree layer	Shrub layer	Herb layer	Bryophyte layer
% cover native	117	58	43	30
% cover invasives	0	~2	1	0
Total % cover	117	~60	44	30

Table 4. The % cover of native and invasive species of each structural layer in the $20m^2$ plot in polygon 1, the restoration focus area.

	Tree layer	Shrub layer	Herb layer	Bryophyte layer
% cover native	30	15	12	2
% cover invasives	0	85	1	0
Total % cover	30	115	13	2

Invasive species make up much more of the % cover in polygon 2, than polygon 1 (Tables 3 and 4). Within the $20m^2$ sampling plot in polygon 2, there was less than 3% invasive species cover. In polygon 1, the most dominant structural layer by far is the shrub layer and in this shrub layer there was 85% cover by invasive species compared to a 15% cover by native shrub species. This is mostly due to the invasive Hawthorn trees that dominate this area and create thickets. The other layers in polygon 1 have fewer invasive species, but those layers are very minimal in biomass and don't make a relatively significant contribution to the % cover of the plot. A full list of species and their % covers for each plot can be found in appendix A.

3.3 Removal Methods and Timeline

During the workday, we had a total of 6 people working for 3 hours to clear an area that was 9m x 7m. The area was mostly cleared at this point, after the workday I put in another approximately 6 hours in total of time to finish clearing the thickets and invasives from the test restoration area. Therefore, we can assume the work taken to clear the test restoration area is

approximately the same as 6 people working for 4 hours. The total area of polygon 1 is between approximately 5650-7500m^2. This number was achieved by using mapping tools and on the ground surveys to determine an approximate size of the polygon. It will take approximately between 360 and 476 hours to remove the thickets and invasive species from polygons 1, if 6 people are working (calculation in appendix E). This is an estimate because not all areas of polygon 1 are dominated by thickets, some areas lack thickets but have extensive English Ivy cover (*Hedera helix*), or Cutleaf Blackberry cover (*Rubus laciniatus*), something we did not deal with in the test restoration site as much. These timing estimates also do not include any planting. In total, the amount of biomass removed from the test restoration site during the workday was 13.4m^3, this was mainly invasives and smaller green material that was not easily broken down into pieces.

3.4 Wildlife Assessment

The bird species assessment that was completed using the Merlin Bird id App gave a list of Chestnut-backed Chickadee (*Poecile rufescens*), American Crow (*Corvus brachyrhynchos*), American Robin (*Turdus migratorius*), Golden-crowned Kinglet (*Regulus satrapa*), Ruby-crowned Kinglet (*Regulus calendula*), Dark-eyed Junco (*Junco hyemalis*), and Bewick's Wren (*Thryomanes bewickii*). Based on a wildlife tree assessment of 5 trees within polygon 2, I saw evidence of woodpecker activity and potentially sapsucker activity based on the sizes of holes in the trees. All information gathered from the wildlife tree assessment can be found in appendix D. There were no wildlife trees found in polygon 1.

4.0 Discussion

4.1 Restoration Considerations

The removal of thickets within the park will greatly reduce the risk of fire to the area as well as allow light to enter the stand so that planted conifer and ground cover species will be able to grow and survive. The goal is to create more diversity in the physical structure of the forest to host a variety of wildlife species. By removing thickets, we are creating both light and space for native conifers and ground cover to grow. The planted test restoration area can be used as a guide to perform the restoration in the remainder of the park, but also as a source of information when it is time to plant. Once other areas of the park are cleared of invasive species and thickets, we can look to the test site to see which native species are performing best under the specific site conditions and will want to be planted throughout. The planting of the remainder of the park is not limited to what has been planted in the test restoration area, in order to have diversity it is important to plant a variety of native species that can contribute to all structural layers of the forest. The test restoration site is merely a starting point.

One species that should not be planted within the park is Western Red Cedar (*Thuja plicata*). In the space directly north of the test restoration site between Kanishay Park and Woodcreek Drive there is an area that appears visually to be of very similar composition to polygon 1 in Kanishay Park. Within this area there are a number of dead or unhealthy cedar trees (10+ trees). This tells me that in the summers this park likely experiences drought and is unable to support Western Red Cedar, a species easily killed by drought-induced stress (Brend, 2019).

The restoration of polygon 1 is estimated to take between 120-160 workdays to complete depending on how many volunteers are able to join. Given this length of time it may be important to plant native species as the clearing work progresses. One thing we found after

removing thickets from the test restoration area was many small invasive blackberry plants. They are likely small due to a lack of light from the thicket cover, but once the thickets are removed, they will have no competition for light and nutrients and they will likely thrive. These blackberry plants were removed when found, but due to their small size it is possible to miss some. In order to combat this, once a smaller area has been cleared, it may need to be planted before moving on to clearing the next area. This is to prevent a different invasive species, such as Ivy or Blackberry, from taking over an area before it has had a chance to be planted with native species that will replace the role of the thickets in shading out invasives.

Although the main focus of this restoration report is the area indicated as polygon 1 within Kanishay park, polygon 2 also experiences invasive species. This area does not have the same issue of thickets as polygon 1 but it does have some invasive species such as Spurge Laurel (*Daphne laureola*) and English Holly (*Ilex aquifolium*). In order to fully restore Kanishay Park I recommend performing a more extensive survey of the polygon 2 area and removing invasives that could be a source of invasive seed for the rest of the park.

4.2 Monitoring

Kanishay Park will require long-term monitoring to ensure the efforts put in by volunteers and Friends of North Saanich Park are not lost. The site is bordered on all sides by private lands, many of these areas are extensively covered in thickets and invasive species like Kanishay Park. Given this, monitoring will likely be needed indefinitely to prevent encroachment of invasives from these areas. The English Ivy (*Hedera helix*), that is fairly extensive in certain areas of the park, is known to grow from small fragments (SSISC, 2023). Although we will try to prevent this with careful removal, it is likely that small fragments will be

left behind during the removal process, leading to a need for monitoring and continued removal of this species. Also, the Common Hawthorn tree (*Crataegus monogyna*) can produce as many as 6000 seeds per year and can grow from off shoots if the root is left behind (Innes, 2020). Since these trees are fairly well established and we are unable to use power tools in the park, we will be unable to remove all the roots and larger tree stems. This, along with the extensive seed bank created by this species will be another reason to require monitoring and continued invasive species removal in Kanishay Park.

5.0 Conclusion

Kanishay Park has a lot of potential to host many native bird species. With a more diverse physical structure we can not only create more habitat for native wildlife, but also mitigate fire risks in the park that are caused by the extensive thickets of invasive species. We cleared a test restoration area of 63m^2 and planted native conifer and shrub species to determine over time, which will grow best with the specific site conditions in this area of the park. The test restoration area will be monitored throughout the restoration of the remainder of the polygon 1. The restoration includes clearing of thickets and invasive species, most prominently Common Hawthorn (*Crataegus monogyna*), English Ivy (*Hedera helix*), and Cutleaf Blackberry (*Rubus laciniatus*). Once the clearing is complete the area will need to be revegetated with native plants, conifer trees and small shrubs, in order to create structural diversity for wildlife, to promote biodiversity, and prevent fast regrowth of invasive species. The clearing portion of the restoration plan will take between 120-160 workdays to complete. Once the park has been cleared of invasive species and planted with native ones, extensive monitoring will be needed to ensure the conifers have enough space to grow and to ensure there is no invasive species return.

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Appendix A: Species Lists

Table 5. A comprehensive species list of plants for the $20m^2$ plot in polygon 2, located at 48.6917, -123.4639.

Common name	Scientific name	% cover	Native or invasive	Structural layer
Grand Fir	*Abies grandis*	70	native	Tree
Western Red Cedar	*Thuja plicata*	20	Native	Tree
Douglas Fir	*Pseudotsuga menziesii*	20	Native	Tree
Bigleaf Maple	*Acer macrophyllum*	7	Native	Tree
Salal	*Gaultheria shallon*	50	Native	Shrub
Trailing Blackberry	*Rubus ursinus*	40	Native	Herb
Red Osier Dogwood	*Cornus sericea*	5	Native	Shrub
Red Huckleberry	*Vaccinium parvifolium*	3	Native	Shrub
Bracken Fern	*Pteridium aquilinum*	3	Native	Herb
Ivy	*Hedera helix*	1	invasive	Herb
English Holly	*Ilex aquifolium*	<1	invasive	Shrub
Nootka Rose	*Rosa nutkana*	<1	native	Shrub
Spurge Laurel	*Daphne laureola*	<1	invasive	Shrub
Oregon Beaked Moss	*Kinbergia oregana*	30	native	Bryophyte

Table 6. A comprehensive species list of plants for the $20m^2$ plot in polygon 1, located at 48.6924, -123.4630.

Common name	Scientific name	% cover	Native or invasive	Structural layer
Common Hawthorn	*Crataegus monogyna*	85	Invasive	Shrub
Black Hawthorn	*Crataegus douglasii*	15	native	Tree
Grand Fir	*Abies grandis*	15	native	Tree
Nootka rose	*Rosa nutkana*	15	native	Shrub
Trailing blackberry	*Rubus ursinus*	10	native	Herb
Snowberry	*Symphoricarpos albus*	5	native	Shrub
Oregon beak moss	*Kinbergia oregana*	2	native	Bryophyte
Unknown tree species (potentially crabapple)	--	15	unknown	Shrub

Creeping buttercup	*Ranunculus repens*	1	Invasive	Herb
Sword fern	*Polystichum munitum*	1	Native	Herb
Large-leaved avens	*Geum macrophyllum*	1	Native	Herb
Honeysuckle sp.	*Lonicera sp.*	<1	native	Herb

Appendix B: Images


Figure 3 (left) and Figure 4 (right). Figure 3 shows the soil pit from polygon 1, the organic soil layer is thick and dark in colour with deciduous leaf litter making up the majority of the organic layer. Below the organic layer, a lighter mineral layer can be seen which is clay dominant. Figure 4 shows the soil pit from polygon 2, the organic soil layer is shallower and there is a thicker layer of undecomposed material, primarily made up of conifer needles. The mineral layer below is made up of coarse material and can be described as gravelly with a crumbly texture.

Figure 5. (left) Biomass removed from the park during the workday on September 30th with Friends of North Saanich Parks. The pile is 13.4m^3 .

Figures 6 and 7 show the restoration test site before and after the workday on September 30th. With the help of the Friends of North Saanich volunteers we were able to cut back the thickets and allow some more light to enter the stand.

Figure 8 (left) shows how the dense thickets block restrict the light entering the stand. This creates a dark environment close to the ground where no vascular plants are able to grow.

Figures 9-11 show the extensiveness of the thickets in polygon 1 of Kanishay Park. The species in particular that are adding to the thickets are Hawthorn, Nootka Rose, Cutleaf Blackberry, and Himalayan Blackberry.

Appendix C: Terrestrial Ecosystem Map

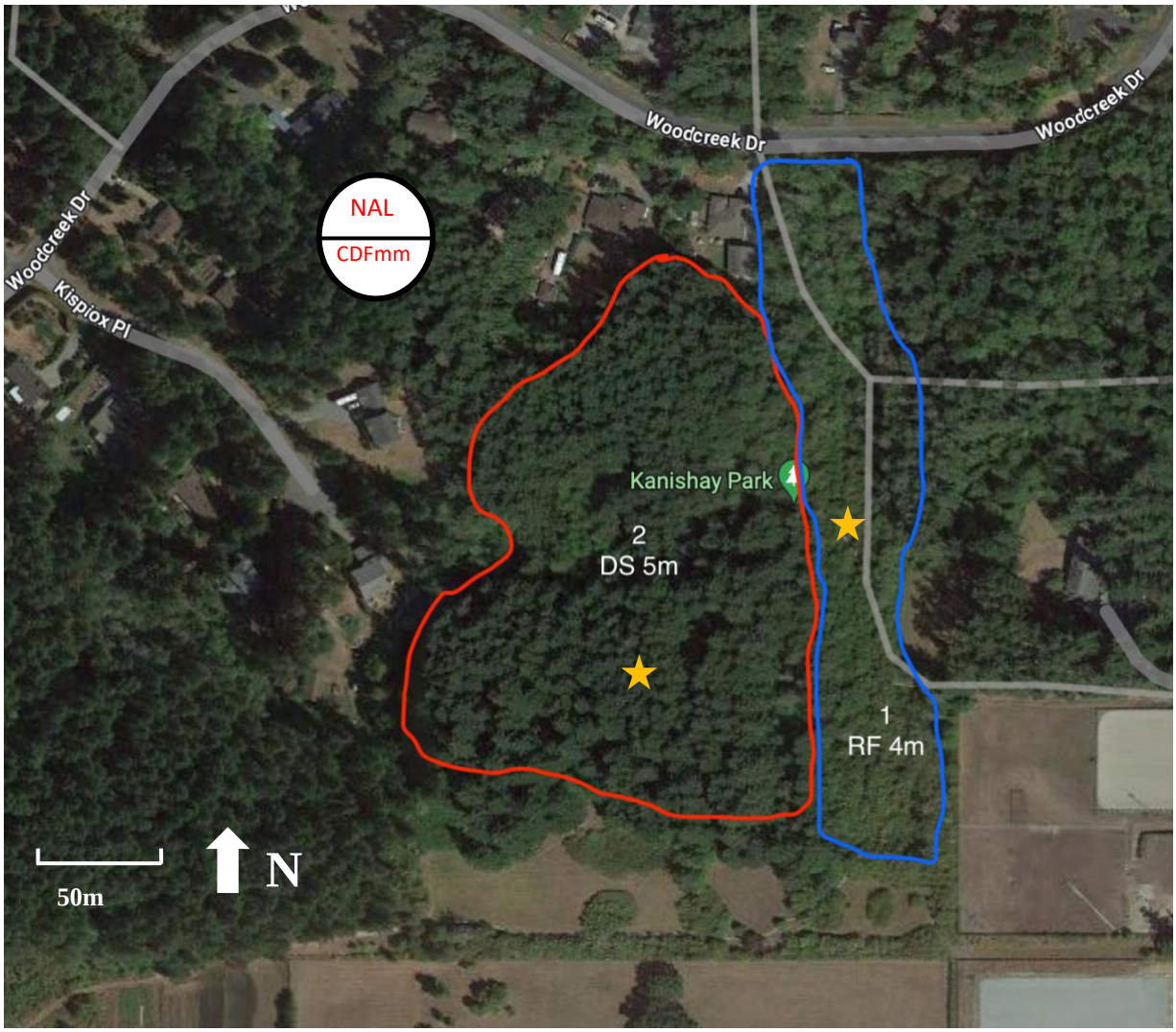


Figure 12. Kanishay Park terrestrial ecosystem map. Polygon 2 is outlined in red and shows an Fd-salal site series. Polygon 1 is outlined in blue and shows a CwBg – foamflower site series. Exact plot locations are indicated by the yellow stars.

Table 7. Legend for the terrestrial ecosystem map of Kanishay Park, above.

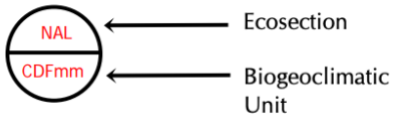
Ecosection and biogeoclimatic units:	
Ecosection:	NAL: Nanaimo lowlands
Biogeclimatic unit:	CDFmm: Coastal Douglas-Fir Zone, moist maritime subzone
Ecosystem Unit label:	Example: 4 DS 6m Ecosystem unit: DS Structural stage: 6 Stand composition: m Polygon number: 4
Plot location symbol:	★

Table 8. site series, codes, and descriptions of the site series for the polygons in the TEM map of Kanishay Park.

Site Code	Description	Site series	Soil moisture regime
DS	Fd -salal	01	Mesic
RF	CwBg - foamflower	06	subhygric-hygric

Appendix D: Wildlife Tree Survey

Tree No.	species	Scientific names	Stand/ fall	DBH (cm)	% Bark remaining	Length (m)	height to live crown
1	Western Hemlock	*Tsuga heterophylla*	stand	203	90	23	--
2	Grand Fir	*Abies grandis*	Stand	120	75	5	--
3	Douglas Fir	*Pseudotsuga menziesii*	Stand	145	95	7	--
4	Douglas Fir	*Pseudotsuga menziesii*	Stand	170	95	26	--
5	Grand Fir	*Abies grandis*	stand	162	100	19.5	--

	Wildlife Codes						
Tree No.	Appearance	Crown	Bark	Wood	Lichen	Wildlife use	Comments
1	4	5	3	3	0	FB	Bracket fungi, pileated woodpecker holes
2	7	7	5	7	2	FB	Pileated woodpecker holes
3	6	6	4	4	1	FB	Woodpecker and sapsucker holes
4	5	5	2	2	2	FB	Bracket fungi, woodpecker holes
5	5	5	1	1	0	--	Witch's broom branches

Tables 9 and 10, a summary of information gathered during the wildlife tree assessment survey.

Appendix E: Calculations

Biomass removed:

pile dimensions 1.3m tall, 2.4m wide, 4.3 m long

1.3m x 2.4m x 4.3m = 13.42m^3

~13.4m^3 biomass removed

Time to clear park calculation:

-6 people worked for 4 hours

-Cleared an area approximately 9m by 7m = 63m^2

63m^2/4 hours with 6 people working

Area of thickets approximately 5650 - 7500 m^2

5650 m^2/63 m^2 = 89.68 x 4 hours = 358.7 hours

7500 m^2/63 m^2 = 119.05 x 4 hours = 476.2 hours

It will take approximately 360-475 hours to clear the thickets in this park.

If Friends of North Saanich is performing this work, who typically work for 3 cumulative hours per workday, it could take between 120-158 days of work to remove the thickets if there were 6 people working each day.

Appendix F: Restoration Plan Summary for FNSP

Invasive species removal: the most predominant invasive species in this park include Common Hawthorn, English Ivy, and blackberry species, both Himalayan and Cutleaf. All of these will need to be removed along with any other invasives found in the park. The area of primary concern is the corridor of approximately 15 metres on either side of the walking path that runs through the park. Many of these species, especially the Common Hawthorn, are causing thickets of dead material. Along with the invasives, all of this dead plant material will also need to be removed or chopped up and stomped into the ground. All larger logs and large woody debris should be left behind. Any invasive English Ivy or invasives that have fruits should be removed.

Common Hawthorn: many of these plants are larger trees, and hand saws can be used to remove the branches and cut them into smaller pieces. Due to not being able to use power tools in the park, many stumps and larger pieces will likely need to be left behind. In this case, remove foliage bearing branches as best as possible to limit fruits and seed dispersal.

Planting: as a result of the extensiveness of the invasives in this park, there will be a lot of relatively bare areas that will likely need to be planted with native species before more invasives are able to take over. Some native species that can be planted include Douglas Fir, Western White Pine, Grand Fir, Western Hemlock, Western Sword Fern, Salal, Foamflower (*Tiarella cordifolia*), Snowberry (Symphoricarpos albus), and other native species.

Given how long it will take to clear the invasives from the park (an estimate of between 120-160 working days was calculated), planting may need to occur intermittently throughout the restoration process. I fear that if areas are left bare for too long, invasive species will be able to grow in those spaces and cause more problems.

Monitoring: monitoring will be required for the foreseeable future to mitigate the return of invasive species in the park.

Considerations: some of the native species, especially Nootka Rose, are also contributing to the thickets and are growing out of control. Even though they are native they may need to be pruned or removed to allow space for conifer saplings to grow. The conifers in this area of the park are visibly stunted due being unable to grow upwards and getting caught in the thickets. This should be taken into consideration when removing/trimming native plants and also when planting conifers. Larger tree species should be planted where there is an open canopy above providing room to grow. Examples of this can be found in the test restoration site.

In figure 13 below, I show different areas where there are specific issues. It could be useful to focus on each of these areas one at a time and plant them once they are cleared of invasives.

When doing this, the species planted in each area can also vary slightly to ensure variation in the species composition throughout the park.

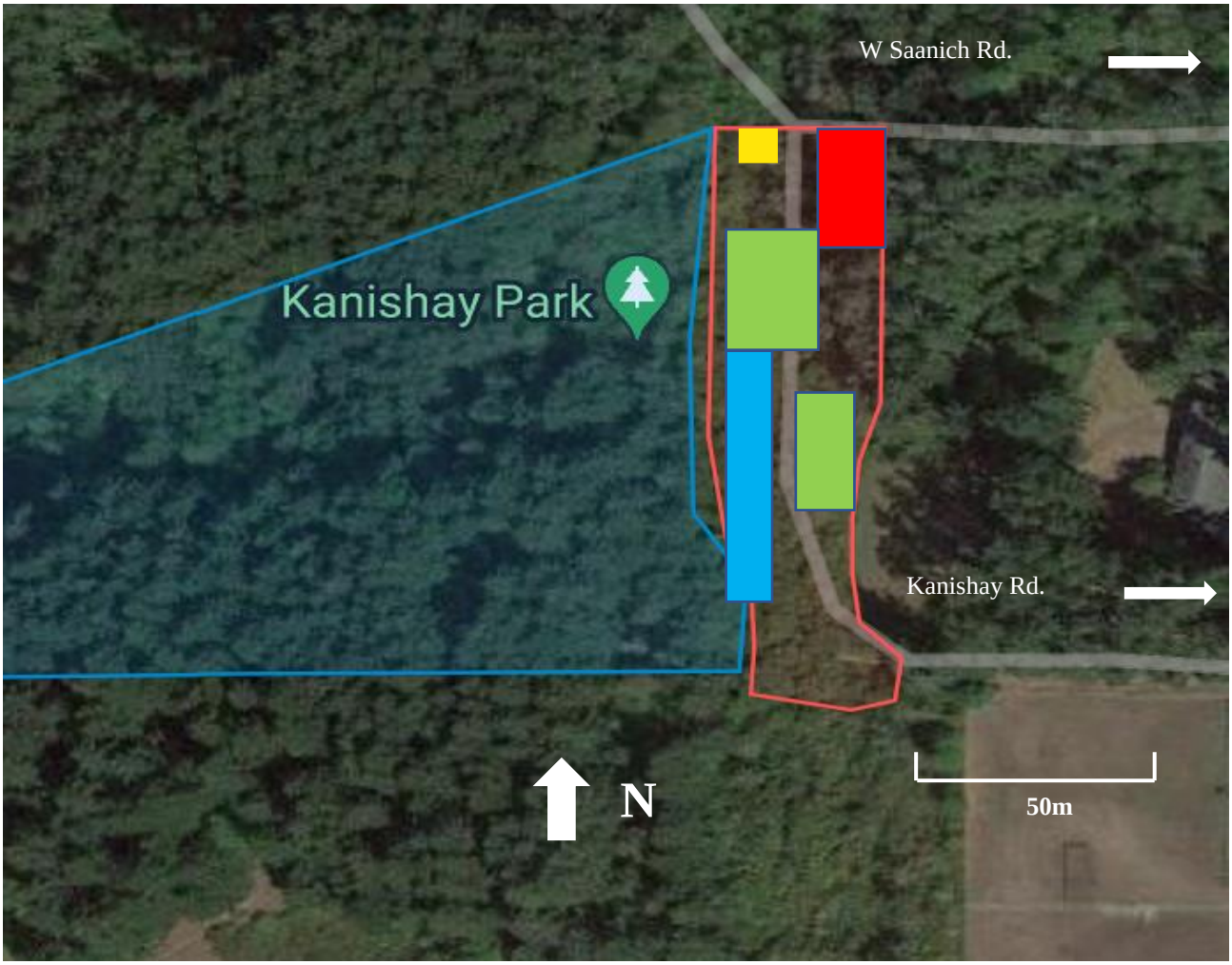


Figure 13. This is the same as figure 1 with a few added areas of specific invasive species. The red outlined polygon in this map is the area of most extensive invasive species, this area is the focus of this report. The red rectangle is the area where English Ivy is the predominant issue. The blue rectangle is the area where the invasive blackberry plants are the main issue. The areas in green are where thickets are the predominant issue. All of these areas deal with a combination of problems not just the primary one indicated, and areas outside of these zones also experience thickets and invasive species.