macphail woods
ecological
forestry project

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Private Forest Land Operational Plan

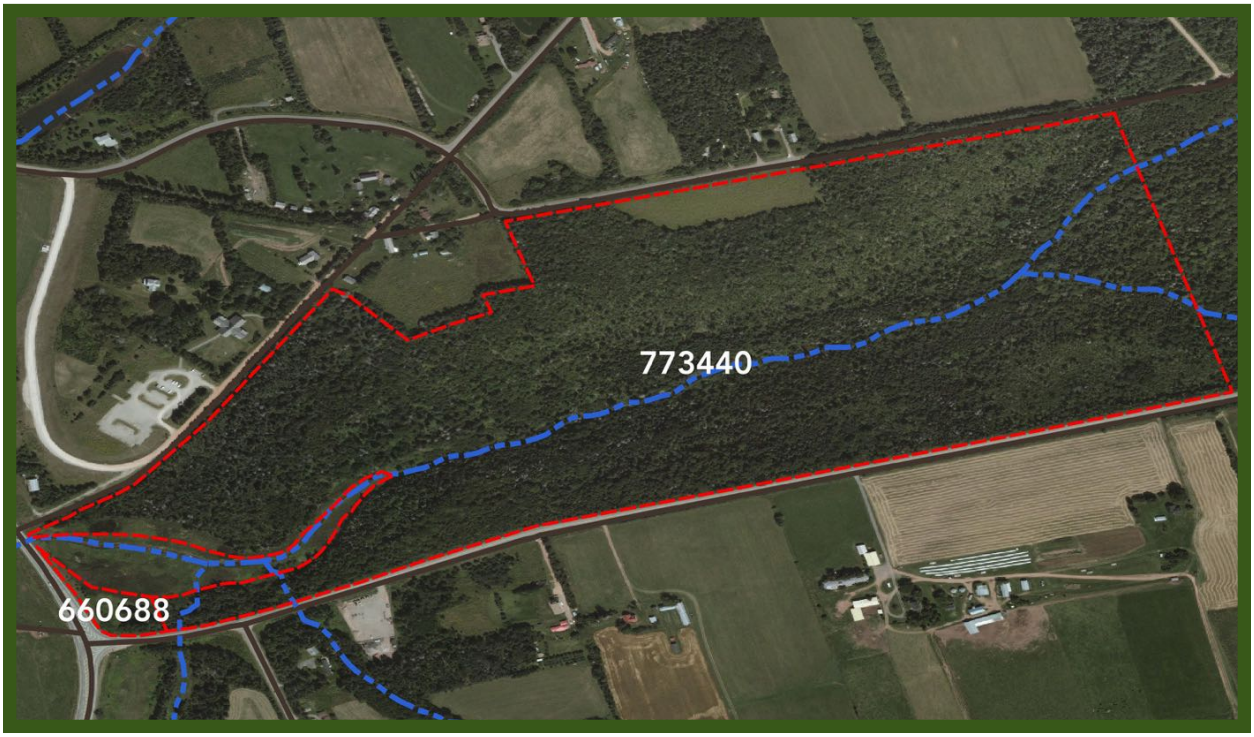
Properties #773440 & #660688 (99.5 acres - 40.27 hectares)

Sir Andrew Macphail Homestead

Orwell , PEI

November 2019

PROPERTY DESCRIPTION



This 100-acre property hugs the Orwell River east of the Trans-Canada Highway. The woodland contains a variety of habitats and histories, and has a strong environmental education and tourism potential due to its proximity to Orwell Corner Historic Village, the Sir Andrew Macphail Homestead, and the Macphail Woods Ecological Forestry Project.

Historically, most of the property has seen heavy harvests over the past 200 years. Historical data shows just under a quarter of the area (approximately 25 acres) was forested in 1900. Of those 25 acres, only about eight acres could presently be considered healthy Acadian forest, containing a variety of older native trees, including eastern hemlock, white pine, yellow birch, and red spruce. By 1958, much of the property had returned to forested land although it was considerably degraded, even-aged, young, and lacking diversity. Due to the disturbances, much of the property has been colonized by a number of non-native species, some of which are considered invasive, with even-aged and declining early successional species dominating the canopy.

The western section of the property is dominated by the Orwell River salt marsh with a number of wetland flora and fauna present, such as cattail, marsh grasses, willows, racoon, muskrat and beaver.

Most of the property is in need of heavy ecological interventions to help restore diversity, remove invasive species and improve wildlife habitat. Several stands are beginning to improve with age but would still benefit from a variety of treatments.

The property surrounds the final sixth of the Orwell River as it enters the Orwell Bay salt marsh. The river still hosts populations of brook trout, smelts still run the river in the spring, and many other native animals from mink and bald eagles to kingfishers and beaver utilize the waterway

and adjacent forest. That being said, much of the riparian zone areas needs work - from clearing fish passage to restoration plantings to the removal of invasive species. With the adjacent property to the east under the ownership of the Sir Andrew Macphail Foundation and the stewardship of the Macphail Woods Ecological Forestry Project, there is a unique opportunity to restore and steward approximately a third of the Orwell River.

Another exciting aspect to consider with this parcel of land is the massive potential for enhancing opportunities for environmental education and experiential tourism through the development of trails connecting Orwell Corner Historic Village to the Sir Andrew Macphail Homestead property. With the trails at Macphail Woods already established and well-used, this addition will allow for the creation of a much larger trail network for outdoor enthusiasts and an educational space for school groups and other visitors. We will also create demonstration areas to showcase ecological forestry practices, and eventually offer walks and workshops on medicinal plants, edible plants, and crafts such as basket-making and harvesting dye plants.

RESTORATION FORESTRY

The philosophy contained in this management plan is best described as restoration forestry, concentrating on the creation of diverse, high-value Acadian forests that will meet the long-term needs of both humans and wildlife. Healthy forests are complex ecosystems, full of great beauty. They are incredibly valuable for many reasons, including ones that are difficult to measure. These include cleaning air and water, storing carbon both in the woody above-ground material and in the soil, providing homes for a wide variety of wildlife species, moderating stream temperatures and windspeeds, and providing places for recreation and relaxation.

As a culture, we don't know how to accurately value these benefits. We can't always put an exact price on these things but they are important. These benefits are often overlooked because they take too much time to measure, or we can't model them on a computer, but we have to start putting values to them instead of pretending they don't exist.

Dr. Ken Lertzman, who teaches Forest Ecology at Simon Fraser University, has a different view of what forest management should be. He says "New Forestry is an attempt to define forest management with timber production as a by-product of its primary function: sustaining biological diversity and maintaining long-term ecosystem health." Part of our work is to learn how to value the ecosystem and not just the wood products.

Through restoration forestry, we work to improve the woodlands - both in quantity and quality - and reverse some of the past practices that have led to degraded ecosystems. The mainstays of the plantings will be high-value trees such as yellow birch, sugar maple, white ash, red oak, white pine and red spruce that grow so well in our climate. We will also be looking to add rare species such as ironwood, witch hazel, hobblebush and yellow violet. But restoration is about more than just adding value and rare species. If carefully executed, this plan will change the structure of the forest by adding ground covers, shrubs and mid-canopy tree species as needed, in order to add diversity to the forest layers. Some birds like to feed in one level and nest in another, or perch at certain levels while hawking for insects. The amount of dead wood in piles on the forest floor for wildlife and to retain water will also increase, as will the number of large, standing dead trees for the dozens of birds and small mammals that use them for nesting.

Healthy wildlife populations are an integral part of sound forest management and quality habitat should be provided for a wide variety of species - everything from owls to salamanders. A study by the Western Pennsylvania Conservancy found that "Forest interior birds require large, mature forests to maintain populations. A variety of species rely on these habitats. Of the nearly 110 species of forest-dependent breeding birds in Pennsylvania, approximately 40 require interior forest to maintain healthy populations. Forest interior birds are often neotropical migratory songbirds, such as Swainson's

thrush and black-throated blue warbler. Other common residents include barred owl, hairy woodpecker, and raptors, like broad-winged hawk."

Barred owls are relatively common on PEI, but run into problems because for the most part they nest in cavities and those wildlife trees must be large enough to not only house the birds but also to remain standing. The size of their territory varies, but in Michigan the home range of barred owls is about a square mile. They tend to favour mixed forests that are 80 years or older. Other species, especially some of the migratory warblers, are adversely affected by forest fragmentation, a condition common both in individual woodlands and certainly when viewing larger blocks. The excess of forest edge allows predators such as cats, raccoons and blue jays easy access to the eggs and nesting young. Nesting success of birds such as black-throated blue and black-throated green warblers, red-eyed and blue-headed vireos, and ovenbirds are much higher in larger blocks of continuous woodlands. Again, this fragmentation is difficult to control if you have a long piece of woodland and your neighbours may cut all they want on either side of you. But the Lindsay woodland and the Macphail Homestead should eventually be one large block of healthy forest, outside of the small agricultural field on the northern side of the property.

The following **"Harvesting Rules for Natural Selection Forestry"** have been developed by Orville Camp, author of The Forest Farmer's Handbook and president of the Forest Farm Association. Mr. Camp is a leading proponent of sustainable logging practices and natural selection forest management in Oregon and across the continent.

1. **Address forest needs first**. In so doing, you will address yours.

2. **Always leave the stronger dominants**. Leaving the strong **dominant trees** will provide the best genetic traits for new stocking in which to best survive environmental extremes. Leaving the strong dominant trees will help maintain the forest health and avoid paying a high ecological price over the long term.

3. **Harvest only those trees that nature has selected for removal**. There are many indicators for determining which individuals nature has selected for removal. One of the best indicators, for example, is when two or more trees of the same age are competing for the same space and the growth rate of one starts tapering off. The one that starts tapering off with respect to the other is usually the one nature has selected out and can be removed. A major benefit in harvesting only naturally selected individuals is in being able to continue addressing the ecological needs of the forest ecosystem. Economically, the costs of using chemicals, slash burning and reforestation can be reduced to zero.

4. **Maintain suitable climate, soil and water conditions for all normally associated species**. These three essentials determine what can live in a given area. Canopy dominants control all three of these conditions below and should not be removed if they will substantially alter the climate below.

5. **Maintain habitat suitable for providing food, shelter and reproduction needs for all normally associated species**. All these needs must continue to be met for each species to survive.

6. **Maintain the natural selection system of "checks and balances" for keeping the forest ecosystem healthy and productive.** There must be adequate populations of all normally associated species for maintaining the best system of checks and balances.

7. **Remove no more than what the forest is truly capable of producing at any given time**. Over-harvesting can substantially reduce production and seriously affect forest health or result in its death.

8. **"Do I feel certain about my decision?" The rule is: "When in doubt, don't!"** Get expert advice or evaluate the situation until you are satisfied with what you propose to do. You may never be able to replace what you are removing nor undo the damage caused by what you have removed. If you still can't decide, it's usually best not to do anything.

SILVICULTURAL TECHNIQUES

This forest management plan promotes, over the long term, a mix of appropriate plant species of all ages growing together in a healthy forest, with a thriving wildlife community. The plant communities will reflect the soil types and moisture regimes as opposed to just being a result of past farming and forestry practices.

To accomplish these goals, plantings should include a wide mix of appropriate native tree and shrub species and some of our rarer wildflowers and ferns. As well, a variety of silviculture techniques should be used to create or enhance appropriate planting areas. Throughout the process of restoration, we will encourage practices that lead to a forest full of long-lived trees and the accompanying plant communities that provide a wide array of values. A critical part of this forest community will include dead wood, both standing and on the ground. Sound forest management demands that wildlife trees are present throughout the forest cycle. You should actually plan for some of the trees to get old, die and fall down to the ground. Towards the end of their lives, these older trees provide seed sources, wildlife habitat, and encourage the surrounding trees to grow taller as they have to reach for the sun in order to photosynthesize. Once they die and fall to the ground, they become nursery logs for the next generation of seedlings and provide valuable nutrients and organic matter. Dead wood is a vital component of all healthy forests.

In the process of restoration, some trees can be removed when they are near the end of their life-cycle, or in small amounts to create openings for other species, as opposed to removing all of them in one operation. In areas with lots of white spruce and balsam fir, more interventions are recommended. As we have successfully demonstrated at Macphail Woods, this can be done either through small patch cuts or strip cuts. Small blocks of trees will be removed, using the remaining trees to provide shade, reduce wind, and increase humidity levels. This will allow successful planting of shade-tolerant species such as sugar maple, yellow birch, hemlock, red spruce and white pine and to promote the growth of high-quality trees for the future. In addition, it will allow us to jump-start the natural succession of shrubs, wildflowers and ferns, including some of our rarest native species.

The techniques that will be used to carry out the forest restoration on this property include:

1. Patch cuts: small cuts, often created by removing only a few trees to enlarge an existing opening, and followed by planting a small number of trees and shrubs. The patches will generally have a diameter no greater than the height of the trees in the area. These patches should be well-spaced and after the regeneration or planted seedlings have become established, subsequent patches will slowly be removed.

2. Early forest enhancement: the careful removal of some of the trees that may be crowding or overtopping more desirable species.

3. Thinning: some judicious thinning will be worthwhile, due to the existing structure of the stands. The only reasons for any thinning should be to improve quality and enhance both the species and structural diversity within the forest.

4. Planting: native plants suitable to the site will be used to add value and improve diversity. These will include high-value trees, wildlife shrubs and rarer species, helping to maintain and increase seed sources for species such as ironwood, witch hazel, hobblebush and even ground flora. Unlike plantations, these plantings will make best use of existing regeneration and rely on strategic placement and species choice rather than large numbers.

5. Pruning: much of the existing regeneration and some of the larger trees as well will benefit greatly from some quality pruning to improve their health and increase future value.

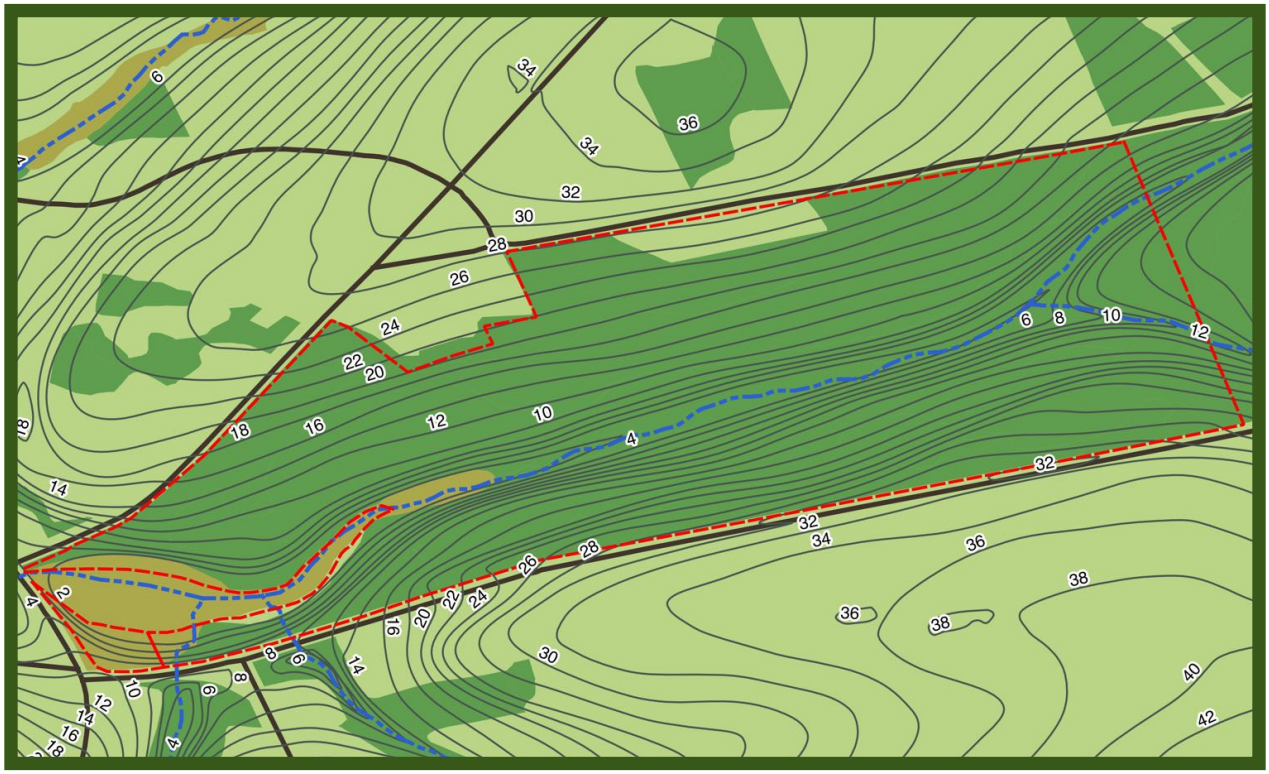
6. Girdling: due to the young age of some of the woodland, there is a generally a shortage of snag trees which are essential to so many wildlife species. There may be opportunities to help create some snags by girdling a few of the larger trembling aspen or red maple.

7. Removal of invasive non-native species: Any non-native species that have the potential to be invasive should be removed before they threaten the native vegetation. Creeping speedwell is one such plant, but unfortunately it is already found throughout the woods, as it is in most Island forests. We did find lots of English oak, Norway maple, European linden, Manitoba maple, European mountain ash, false spirea, glossy buckthorn, and a euonymous.

8. Adding coarse woody debris: some of the stands could use more rotting wood on the ground. This would provide much-needed nutrients and organic matter, create habitat for salamanders and other forms of wildlife, improve the water-holding capacity of the site and in the future act as nursery logs for seeds such as yellow birch and hemlock. When we're doing patch cuts, we'll pile up brush or pulp to provide protection and organic matter.

FOREST STANDS 2019

PROPERTY MAP WITH CONTOURS



STAND 1 **(8.63 acres - 3.49 hectares)**

DESCRIPTION

This long narrow stand is a remnant of the edge of forested land from the early 1900's. The land to the north was farmland during the 1800's while the area to the south was heavily harvested but never farmed.

Since then, this stand primarily grew up in white spruce and trembling aspen. Most of these trees have since died off, while those few that remain are old and declining, and easily blown down during wind and ice storms. Some red maple, white birch and white pine left over from the previous cutting are present throughout, although most grew up in relatively full sun which has made them short and branchy. Balsam fir has also entered the stand from the forests to the south, creating dense cover in the sub-canopy. European mountain ash has seeded in from the surrounding areas to become the dominant sub-canopy throughout the stand.

While the whole stand showcases a series of ecological issues from lack of diversity to short canopy height to poor tree health, it does display lots of use by local wildlife, from grouse drumming to woodpecker signs to mammal runs throughout. There is also an abundance of berries from the many European mountain ash, wild rose, wild strawberry, mountain holly and blue bead lily, as well as bayberry.

Overtime, without intervention, this stand will continue to be dominated by European mountain ash until the balsam fir eventually shades out the mountain ash. The dense shade created by balsam fir will eventually inhibit berry producing shrubs as well as the regeneration of most other tree species. Through careful treatments, this stand will be restored into a healthier forest with a

diversity of species and improved wildlife habitat. It will provide seed sources for future generations of plants that will help to improve the ecological integrity of the Orwell River.

TREATMENT

Prune and release red maple, white birch, white pine and red oak.

Create three patches in the northeast corner of the stand, 25-30' in diameter. Thin the balsam fir in the southwest corner of the stand before carrying out enhancement plantings.

Underplant yellow birch, white ash, sugar maple, striped maple, red oak, eastern hemlock, red spruce, white pine, beaked hazelnut, witch hazel, hobblebush, alternate-leaf dogwood, round-leaf dogwood, serviceberry, hay-scented fern, interrupted fern, Jack-in-the-pulpit, yellow violet, hairy sweet Cicely, twinflower and creeping snowberry.

Remove English oak.

STAND 2 **(4.37 acres - 1.77 hectares)**

DESCRIPTION

This stand has seen heavy cuts right up to its borders as well as smaller harvests in the last 120 years. However, due to its proximity to the Orwell River and its sloping topography, it still boasts a good variety of tree species, including eastern hemlock, white pine, yellow birch, balsam fir and red spruce.

Most of the trees in this stand are under 80 years old but some older specimens remain. The canopy varies throughout the stand with sunnier, open areas along the river and dense sections along the north and south banks. Dominated in equal parts by balsam fir and yellow birch, most of this stand is shady and moist, creating a beautiful forest floor comprised primarily of mosses and ferns. The sunnier patches along the river boast a variety of non-native and native wildflowers and ferns including some beautiful swaths of ostrich ferns.

Some non-native invasive species are present along the river such as English oak, Norway maple and Scots elm. There are both brook trout and smelt present in the river with a variety of other animals frequenting the stand, from raccoons and wood frogs to woodland jumping mice and mink.

TREATMENT

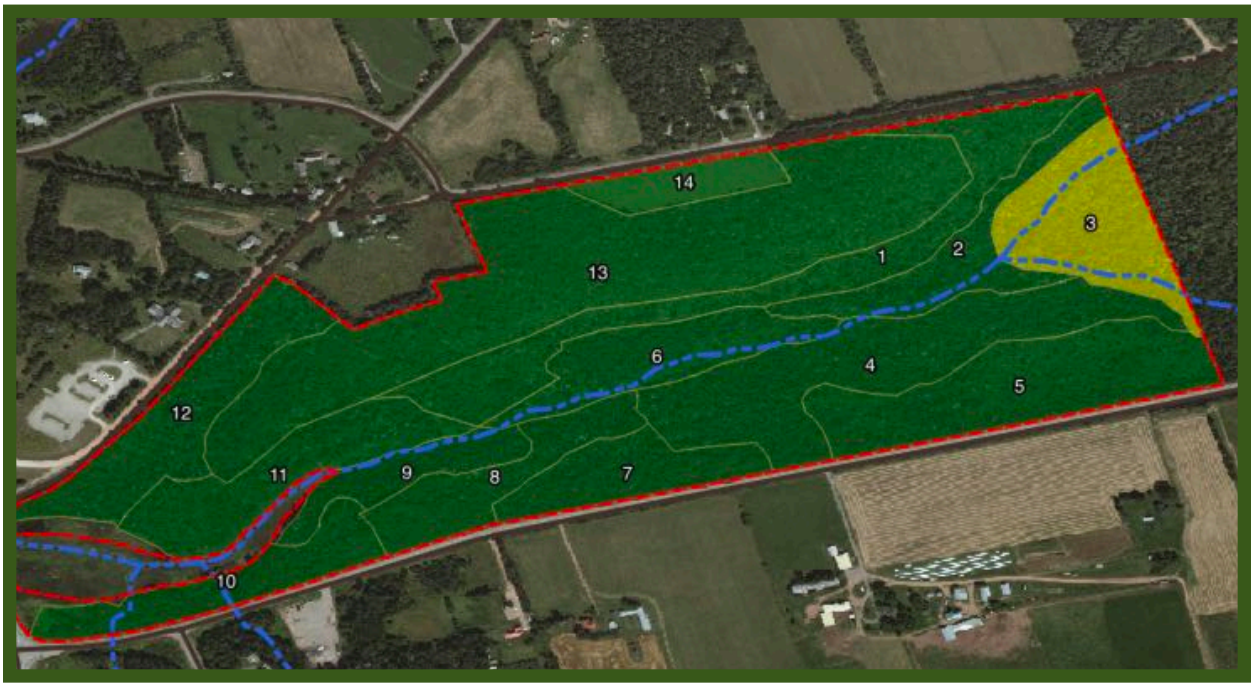
Special Note: Due to the proximity of the Orwell River, a permit will need to be obtained for any cutting done in this stand. That being said, this relatively small and narrow stand would not benefit from opening up too much of the stand, which would result in a new boom of balsam fir. Any removal of trees from this stand would be to release existing high-value species or to create small planting areas for diversity plantings.

Prune and release all good quality yellow birch, red spruce, white pine, eastern hemlock and red maple.

Drop any coarse woody debris so that is touching the ground to increase organic matter in the soil, improve habitat for salamanders, toads and other fauna, as well as to improve water retention and absorption. Wood in contact with the ground begins to rot more quickly and provides a good nursery bed, especially for seeds of yellow birch and eastern hemlock.

Carry out restoration plantings throughout the stand of white ash, red oak, sugar maple, striped maple, ironwood, red spruce, hobblebush, witch hazel, beaked hazelnut, Christmas fern, male fern, Jack-in-the-pulpit, trilliums, bunchberry, bluebead lily, yellow violet, twinflower and false lily-of-the-valley.

STAND 3 **(6.38 acres - 2.55 hectares)**



DESCRIPTION

This stand is by far the least disturbed area on the whole property, showcasing much older trees on average as well as a good variety of late successional species. The canopy is dominated by large trees such as eastern hemlock, yellow birch, white pine and red spruce that are at least 150 years old. This shady woodland encompasses the eastern section of the Orwell River as well as a small tributary running from the southeast. Each of these waterways run through small but relatively steep valleys with the centre of the stand growing atop a small hill roughly eight meters above the streams.

The high-quality trees on this stand are critical seed sources for the surrounding stands and the adjacent Homestead property. This process can be seen in the species regenerating on the forest floor - beautiful young specimens of red maple, red spruce, eastern hemlock, white pine and yellow birch. There are also areas that are dense with a mix of young balsam fir and many older and taller balsam fir which are declining in health.

This stand also is a crucial stand for wildlife, hosting an active bald eagle nest for the last 15 years as well as providing hunting grounds for barred owls and habitat for red-back salamanders, American toads, raccoons and a large variety of warblers and other songbirds. The more mature canopy provides an ideal habitat for later successional trees, shrubs, wildflowers and ferns.

TREATMENT

Prune and release young quality yellow birch, red spruce, eastern hemlock, white pine, and red maple.

Drop any coarse woody debris so that is touching the ground to increase organic matter in the soil, improve habitat for salamanders, toads and other ground fauna as well as improve water retention and absorption.

Establish plantings of white ash, sugar maple, red oak, American beech, striped maple, beaked hazelnut, hobblebush, witch hazel, clematis, Christmas fern, male fern, trilliums, Jack-in-the-pulpit, hairy sweet Cicely, yellow violet, creeping snowberry, and twinflower.

Care should be taken in enacting any work on this stand as riparian zones are both ecological sensitive and crucial wildlife habitat. Some clearing of downed trees in the river should be done to help improve habitat and clear fish passage.

STAND 4 **(10.84 acres - 4.39 hectares)**

DESCRIPTION

Most of this stand was not considered forested land, according to records from 1900, save for the edges bordering the Orwell River. By 1935 most of the stand was growing back up primarily in white spruce, red maple and balsam fir, although old aerial photos show cutting took place near the southern border of the stand shortly before 1935.

The history of this section has led to a relatively even-aged stand of declining old field white spruce, many of which have died naturally or been blown down in the last 10 years of winter storms and hurricanes. Hurricane Dorian caused a significant number of the remaining standing spruce to fall in 2019. The balsam fir that were once an understory species have come to dominate the canopy, creating dense shade throughout. Some older deciduous trees, primarily multi-stemmed white birch and red maple as well as trembling aspen, create some small patches of dappled light.

A lack of diversity, excessive blow-down, and heavy shading are the three primary issues with this stand. Ground cover is dominated by coarse woody debris, much of it hung up off of the ground, and leaf litter with some pockets of wildflowers and ferns near the deciduous trees. The balsam fir have come to dominate the stand, shading out many other species and limiting natural regeneration to more balsam fir and some small stunted red maples. Without intervention, this stand will be very slow to restore itself to a healthy tract of woods.

TREATMENT

Drop any coarse woody debris so that is touching the ground to increase organic matter in the soil, provide better habitat, and improve water retention and absorption.

Prune and release red maple, white birch, trembling aspen, white pine and red spruce.

Establish 20-25 patch cuts in areas of densest balsam fir of roughly 56’ in diameter to slowly open up enough light for natural regeneration and to encourage the growth and development of restoration plantings. Care should be taken not to open up too large an area as the balsam fir waiting in the understory will take over the openings if given the opportunity.

Plant yellow birch, white ash, red oak, American beech, sugar maple, ironwood, striped maple, eastern hemlock, red spruce, beaked hazelnut, hobblebush, witch hazel, mountain holly, serviceberry, clematis, Christmas fern, male fern, wood ferns, crested wood fern, oak fern, twinflower, trilliums, yellow violet, white baneberry and wild sarsaparilla.

Create brush and log piles to improve wildlife habitat, sequester carbon, improve water retention and eventually add organic matter and nutrients to the soil.

STAND 5 **(8.9 acres - 3.6 hectares)**

DESCRIPTION

Similar to Stand 4, this section of woods was farmed until sometime between 1900 and 1935. It then grew up in old field white spruce of which most have died off over the last 30 years. This has left the stand lacking much of an upper canopy with only a relatively few tall white spruce remaining. This heavy die off over the last few decades has created an uneven canopy with some patches of white spruce and trembling aspen approximately 56’ in height while the rest of the forest is dominated by young white birch, trembling aspen and European mountain ash about 33’ tall.

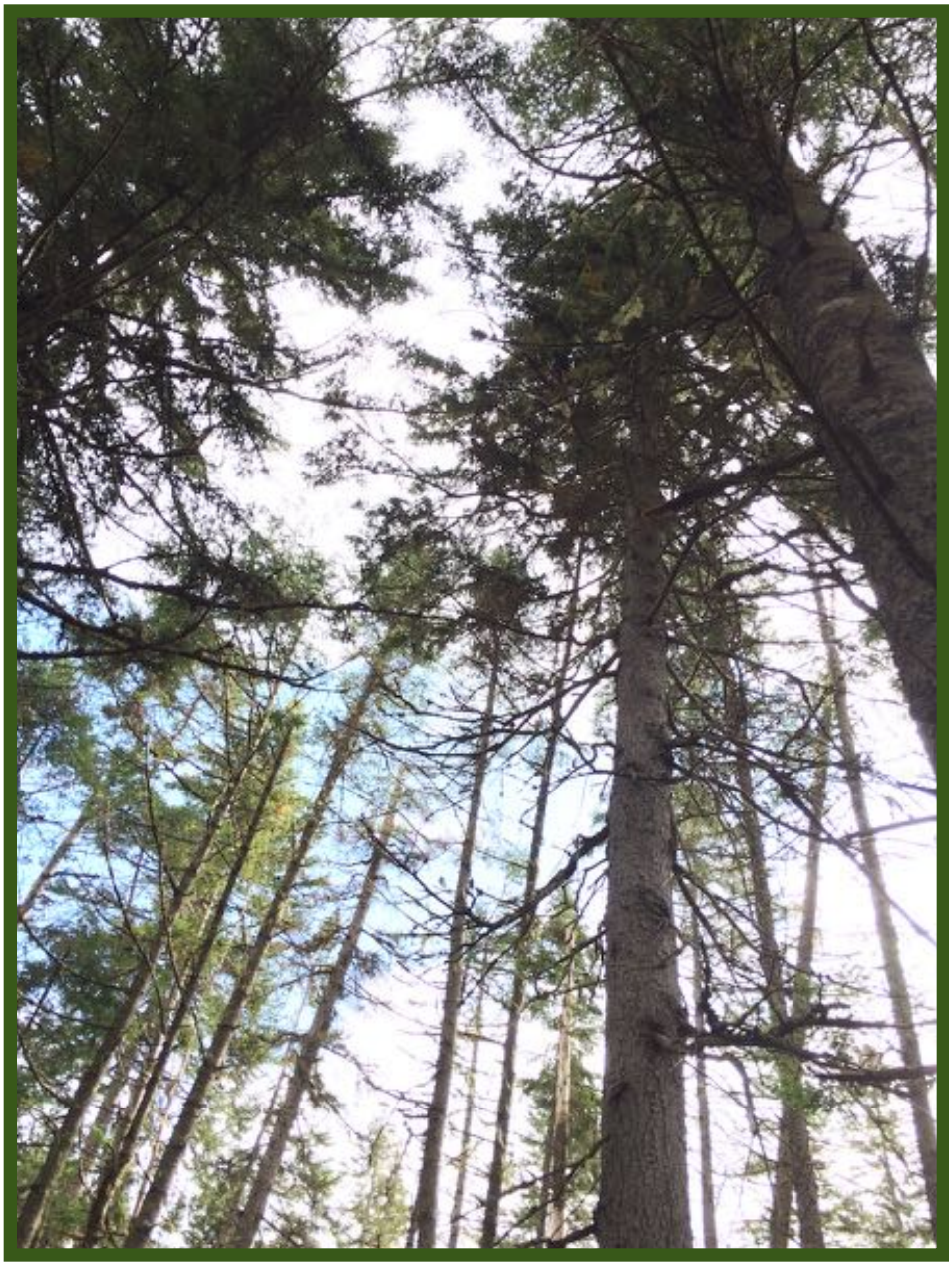
The low deciduous canopy lets in light throughout the stand, creating a relatively sunny but sheltered forest floor. It is primarily covered in various wildflowers, as well as raspberries and blackberries. This stand also hosts a wide variety of non-native and invasive species such as English oak, European linden, Norway maple, red ash and European mountain ash. Again, winter storms and hurricanes have battered the aging spruce canopy, which has led this stand to have abundant coarse woody debris and many hung-up trees. The increase in light hitting the forest floor due to the lack of a proper canopy has created a temporary food haven for birds and other wildlife. There were many warblers heard during the site visit as well as ample signs of wildlife frequenting the area.

TREATMENT

Prune and release existing white birch, red maple, and red oak.

Restoration plantings should be focused on further improving and diversifying wild food sources in the short term and establishing the next generation of tree species to help push this stand further along in its natural succession. Species to plant include sugar maple, yellow birch, white ash, red oak, striped maple, white pine, beaked hazelnut, red-berried elder, alternate-leaf dogwood, round-leaf dogwood, mountain holly, clematis, Braun's holly fern, male fern, royal fern, herb Robert, hairy sweet Cicely, Canada anemone, yellow violet.

Drop any fallen wood that is hanging up so that is touching the ground to increase organic matter in the soil, create habitat for ground fauna, and improve water retention and absorption.



STAND 6 **(5.01 acres - 2.03 hectares)**

DESCRIPTION

Another riparian zone stand along the Orwell river, this section saw heavy harvesting in the 1800's. The northern-most border of this stand would have seen some farming where the slope wasn't too heavy. By 1935, after the abandonment of much farmland in the area, aerial photos show sparse tree growth north of the Orwell River, while the southern bank was home to slightly older and bigger trees.

Due to the heavy interventions in this stand's recent past, much of it regenerated in old field white spruce. Most have died off leaving the area to be dominated by balsam fir, which now makes up approximately 60% of the canopy. The fir have developed into a tight canopy, creating dense shade throughout much of the stand with open sunny pockets along the Orwell River. Due to the river and the relatively good biodiversity compared to nearby stands, this section hosts ample wildlife from racoons and mink to smelt and kingfishers to muskrats and beaver.

The open conditions along the river have encouraged a wide variety of native plant species to proliferate as well as many non-natives such as Manitoba maple, Norway maple, English oak, European linden, bittersweet nightshade and creeping buttercup. This stand also boasts a wide variety of native ferns from ostrich fern to oak fern to beech fern as well as many of the wood ferns and more.

TREATMENT

Care should be taken in enacting any work on this stand as riparian zones are both ecologically sensitive and provide critical wildlife habitat. Some clearing of downed trees in the river should be done to help improve habitat and clear fish passage.

Create ten small patch cuts (56' in diameter) north of the Orwell River in the areas of densest fir.

Remove invasive species such as English oak, Norway maple, European linden and Manitoba maple.

Drop any coarse woody debris so that is touching the ground to increase organic matter in the soil, improve habitat for salamanders and other ground fauna, and improve water retention and absorption.

Underplant a variety of native plants to increase diversity and provide food for a variety of birds and mammals. These will include ironwood, yellow birch, red maple, eastern hemlock, witch hazel, hobblebush, beaked hazelnut, clematis, Braun's holly fern, Christmas fern, Jack-in-the-pulpit, herb Robert, white baneberry, hairy sweet Cicely, and Joe Pye weed.

In the patch cuts, plant white ash, sugar maple, striped maple, yellow birch, red oak, ironwood, eastern hemlock, red spruce, witch hazel, hobblebush, beaked hazelnut, male fern, Christmas fern, yellow violet, trilliums, hairy sweet Cicely, twinflower, and white baneberry.

STAND 7 **(3.95 acres - 1.6 hectares)**

DESCRIPTION

This stand was farmed until sometime after 1900. The 1935 aerial photos show a young but established forest, most likely dominated by old field white spruce. Like the trees in many of the other stands south of the Orwell River, the white spruce have been declining in health for decades resulting in the majority of them dying and blowing over during winter storms and hurricanes. While the white spruce dominated the canopy, balsam fir, white birch and red maple, as well as a small amount of red spruce, seeded in. These species have come to make up the bulk of the present-day canopy with the fast-colonizing balsam fir becoming the dominant tree in recent decades.

Due to the varying growth of different species, the stand now has an uneven canopy with a shorter but heavier layer of balsam fir and pockets of taller deciduous trees and the few remaining white spruce creating a sparse but less-shady taller layer. This has resulted in varying light levels reaching the forest floor. Much of the ground has little to no wildflowers or ferns, dominated by needles and coarse woody debris due to the heavy shade of the fir. Where there is dappled light, you'll find created pockets of ground cover made up of wood ferns, bunchberry, Veronica and European mountain ash.

This stand lacks good biodiversity of both flora and fauna, although it is still important habitat which would benefit from thoughtful intervention. A lack of adequate snag trees and food sources as well as ground cover made this stand noticeably quieter with only blue jays and a red squirrel found during the site visit.

TREATMENT

Create 8 patch cuts, 40-50’ in diameter throughout areas of thickest balsam fir.

Prune and release any red maple, white birch, American beech and red spruce. Any multi-stemmed red maple that are healthy should be thinned down to one or two stems.

Plant yellow birch, red oak, sugar maple, white ash, striped maple, eastern hemlock, white pine, witch hazel. beaked hazelnut, hobblebush, American fly honeysuckle, mountain holly, American mountain ash, Christmas fern, interrupted fern, bluebead lily, wild sarsaparilla, yellow violet, trilliums, baneberry, herb Robert and wild lily-of-the-valley.

Drop any hung up trees and ensure that all coarse woody debris (other than standing snags) is touching the ground to increase organic matter in the soil, create habitat for salamanders and other ground fauna, and improve water retention and absorption.

STAND 8 **(4.21 acres - 1.7 hectares)**

DESCRIPTION

In 1900, three quarters of this stand was being farmed. Only the northeastern strip along the Orwell river was forested at that time. By 1935, farming was abandoned and the whole stand was returning to forest. The southwest area dominated by old field white spruce and the northeast section by yellow birch, red maple and white birch. The southwest section initially grew up in old field white spruce, which have since died although a small number are now snag trees of medium quality. The balsam fir never came to dominate the stand due to surrounding seed sources, so much of that part of the forest is now dominated by multi-stemmed red maple, white birch and yellow birch. The multi-stemmed nature of these specimens as well as aerial photos from 1958, indicate partial harvests had been carried out sometime in the mid-1900's.

The relatively good number of snag trees and more diverse mix of species have created better wildlife habitat then in the stands to the east and west. Although shading varies throughout the stand, enough of the area has dappled light conditions, which has resulted in a diversity of fern species covering almost half of the forest floor. There is also a good number of small red oaks regenerating throughout the stand.

TREATMENT

Drop any coarse woody debris so that is touching the ground to increase organic matter in the soil, improve habitat for salamanders and other ground fauna, and improve water retention and absorption.

Prune and release red oaks, yellow birch, white birch, red spruce and red maple. Prune larger multi-stemmed specimens to good health, generally eliminating all but one-three stems.

Establish restoration plantings of ironwood, yellow birch, sugar maple, striped maple, red oak, American beech, white ash, eastern hemlock, red spruce, beaked hazelnut, American fly honeysuckle, mountain holly, witch hazel, hobblebush, male fern, Christmas fern, trilliums, herb Robert, hairy sweet Cicely, bluebead lily, and twinflower.

STAND 9 **(2.81 acres - 1.14 hectares)**

DESCRIPTION

Another riparian zone stand, this north-facing sloped area was not farmed and has been forested since at least 1900. The present-day species of white spruce, red spruce and balsam fir, and the lack of other species such as eastern hemlock, indicate that heavy harvesting was done sometime in the 1800's. The longer-lived red spruce are still growing and have become the tallest and largest trees in the stand, although less numerous than the balsam fir. The white spruce throughout the stand may be the second generation of spruce after the cuttings in the 1800's. They are currently reaching the end of their lives with many in decline and others already dead and standing, providing a healthy number of medium-sized snag trees for wildlife.

The dominance of coniferous trees throughout this stand has created heavy shade throughout this stand with the ground cover composed of leaf/needle litter and moss. Some small pockets of ferns are growing on the particularly moist and shady slopes towards the Orwell River. Although the dense shade limits natural regeneration, small numbers of shade-tolerant species such as balsam fir, red oak and red spruce are found growing throughout.

Even though there is much that could be done to improve wildlife habitat in this stand, the ample number of snags, proximity to the Orwell River and its location in the midst of the larger areas of forest has made it a well-used stand with numerous animal paths, tracks, signs and scat found during the site visit.

TREATMENT

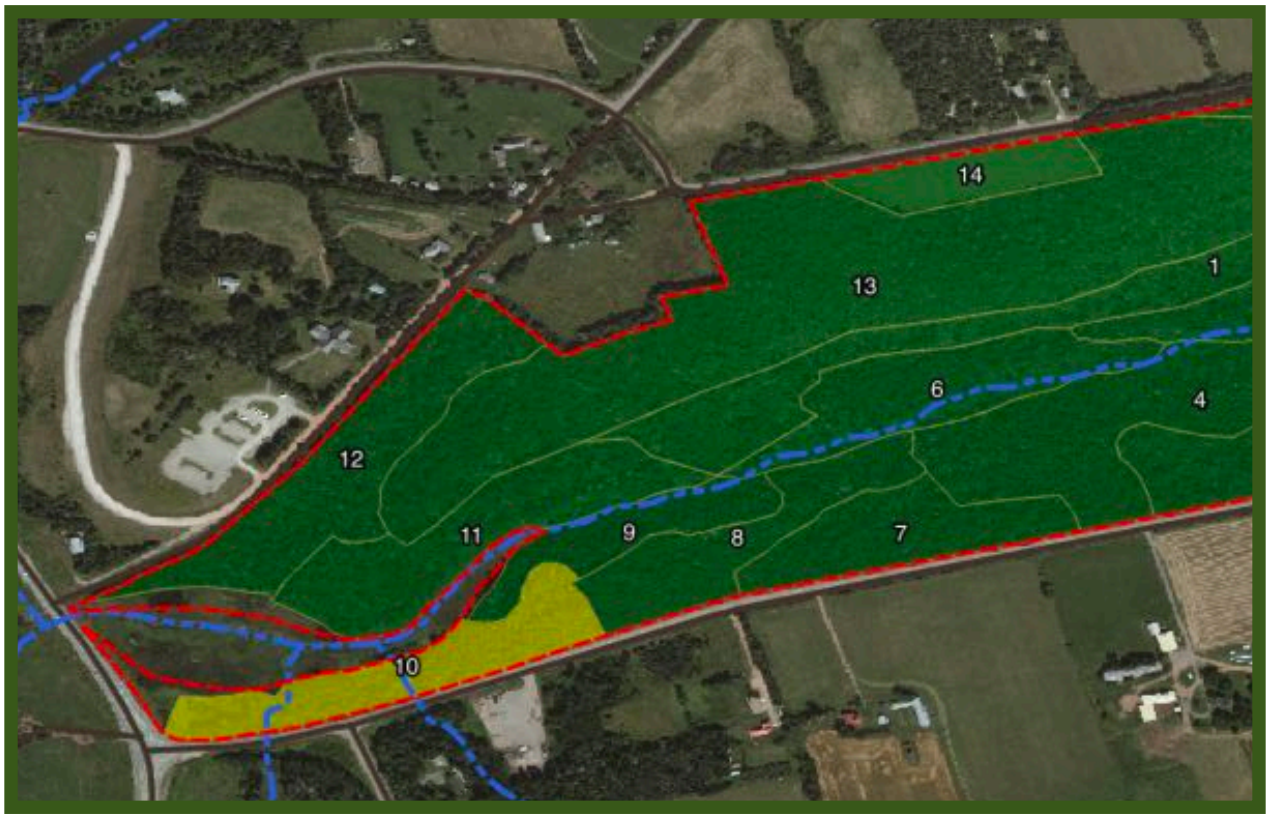
Care should be taken in enacting any work on this stand, as riparian zones are ecologically sensitive and provide critical wildlife habitat. Some removal of downed trees in the river should be done to help improve habitat and clear fish passage.

Prune and release any young red spruce, red oak, and yellow birch. Due to the sensitive nature of this stand and its small and narrow shape, the area of release can be enlarged to create micro-patches for restoration plantings.

Establish restoration plantings of sugar maple, yellow birch, red oak, American beech, ironwood, striped maple, eastern hemlock, white pine, hobblebush, witch hazel, American mountain ash, Jack-in-the-pulpit, yellow violet, hairy-sweet Cicely, Christmas fern and male fern.

Drop any coarse woody debris so that is touching the ground to increase organic matter in the soil, create habitat for salamanders and other ground fauna, and improve water retention and absorption.

STAND 10 **(4.44 acres - 1.8 hectares)**



DESCRIPTION

Most of this stand has been forested since before 1900, although it has seen various heavy harvests over the years. The section of the property west of the western tributary lacked substantial forest cover until 2000. The area immediately surrounding the tributary further east was clear of trees until sometime shortly after 1958. This whole stand slopes moderately towards the marsh to the north.

Although this stand was once dominated by white spruce, most are now dead, and any good-sized snags that were created are no longer standing. The dying white spruce gave way to trembling aspen and red maple, thriving in the generally wet conditions which are due to the tributaries and the proximity of the marsh. Many of the red maple and white birch show signs of the heavy harvesting, with multiple stems that are growing up from the stumps of the cut trees. Although today's dominant canopy is deciduous, this stand has relatively little southern exposure, creating medium shade throughout.

This stand acts as a crucial wildlife corridor, allowing safe passage between nearby woodlands south of the Kinross Road and the Orwell marsh to the north. Raccoon scat, woodpecker signs, and red squirrel middens were found. There were also more birds present than in the adjacent Stand 8. The relatively dense shade, north facing slopes and deciduous canopy has resulted in an abundance of leaf litter dominating the forest floor, although the moisture levels in the soil have allowed small areas of ferns and wildflowers to propagate. While this stand is more diverse then other stands south of the Orwell River, it still lacks a good mixture of species and

would greatly benefit from restoration plantings as well as interventions focused on improving wildlife habitat.

TREATMENT

Care should be taken in enacting any work on this stand as riparian zones are ecologically sensitive and provide critical wildlife habitat.

Prune and release red oak, American beech, red maple, and white birch. Prune larger multi-stemmed specimens to good health, generally eliminating all but one-three of the stems.

Establish restoration plantings of sugar maple, striped maple, ironwood, eastern hemlock, white pine, red spruce, witch hazel, hobblebush, mountain holly, clematis, bluebead lily, yellow violet, Jack-in-the-pulpit, white baneberry, wild sarsaparilla, Christmas fern, male fern, and cinnamon fern.

Drop any coarse woody debris so that is touching the ground to increase organic matter in the soil, create habitat for salamanders and other ground fauna, and improve water retention and absorption. Brush and log piles will be created to further improve habitat and to keep moisture levels high in the area.

STAND 11 **(5.84 acres - 2.36 hectares)**

DESCRIPTION

This stand was only partially farmed, according to 1935 aerial photos. A small strip of forested land along the river has had consistent tree cover since at least 1900. Similar to other previously farmed stands, this old field regenerated into a predominantly old field white spruce forest. The southern edge along the river has more deciduous trees due to the previously harvested red maple and white birch growing back from stump sprouts. The white spruce have been declining in recent decades, creating the two-layered patchy canopy that now exists. The upper canopy is composed of widely spaced larger white spruce nearing the end of their life with a good amount of standing dead spruce. This has resulted in a healthy amount of medium-sized snag trees for wildlife. The lower canopy is dominated by multi-stemmed red maple and white birch trees as well as dense European mountain ash and some small swales of speckled alder.

Due to the patchy canopy, light is still hitting the forest floor. This has resulted in a good ground cover of mosses and various ferns, including hay-scented fern, cinnamon fern and mountain wood fern. There is also an abundance of native shrubs such as alternate-leaf dogwood, red-berried elder, willow, high-bush cranberry, speckled alder, and chokecherry. There is also a large presence of the non-native European mountain ash as well as some old field weeds such goldenrods and hawkweed.

The large diversity and number of shrubs, as well as the proximity to the river, has made this a well-used stand by wildlife with numerous animal runs and middens found during the site visit. There has been a lot of white spruce blown over throughout the stand leaving lots of coarse woody debris, although much of it is hung up off the ground. There is also a diversity of

regenerating species, however many continue to be early to mid-successional species due to the lack of nearby seed sources.

TREATMENT

Care should be taken in enacting any work on this stand as riparian zones are ecologically sensitive and provide critical wildlife habitat. Some removal of the downed trees in the river should be done to help improve habitat and clear fish passage.

Drop any coarse woody debris so that is touching the ground to increase organic matter in the soil, create habitat for salamanders and other ground fauna, and improve water retention and absorption. Brush and log piles will be created to further improve habitat and to keep moisture levels high in the area.

Underplant red oak, yellow birch, white ash, black ash, striped maple, white pine, red spruce, eastern hemlock, eastern white cedar, beaked hazelnut, wild raisin, serviceberry, mountain holly, interrupted fern, sensitive fern, wood ferns, male fern, royal fern, Christmas fern, trilliums, Jack-in-the-pulpit, twinflower, herb Robert, hairy sweet Cicely, and yellow violet.

Prune and release red maple, white birch, red oak, American beech, and yellow birch. Prune larger multi-stemmed specimens to good health, generally eliminating all but one-three stems.

STAND 12 **(6.71 acres - 2.71 hectares)**

DESCRIPTION

Stand 12 was completely farmed until sometime between 1935 and 1958. Aerial photos from 1958 show a small newly established forest. Due to the younger age of the trees on this stand, the old field white spruce are still the dominant tree, making up roughly 70% of the canopy. That being said, many have died or are in decline, creating a patchy canopy of taller white spruce with both trembling aspen and white birch rapidly filling space in the canopy. Without intervention, this stand will transition to a predominantly aspen/birch stand with an mid-layer of European mountain ash within the next two decades.

Due to the proximity of Orwell Corner Historic Village, many non-native trees have seeded into the stand including European linden, English oak, red ash as well as many non-native wild flowers such as bittersweet nightshade. The whole stand has good southern exposure, boosting light levels reaching the shrub layer. This has resulted in a good diversity of fruit and seed-bearing shrubs present throughout the stand. An abundance of song birds were found, most likely foraging for food amongst the shrubs or sheltering in the woods before visiting the nearby fields and marsh.

The declining white spruce and the exposed site have created a large quantity of blow down, most of which are hung up in other trees or simply not resting on the ground. There is also a power line running along the dirt road leading into Orwell Village, and some of the trees have been topped to accommodate. Regeneration on the forest floor is currently limited to predominantly non-native species other than a number of small red oak growing on site.

TREATMENT

Drop any coarse woody debris so that is touching the ground to increase organic matter in the soil, create habitat for salamanders and other ground fauna, and improve water retention and absorption. Brush and log piles will be created to further improve habitat and to keep moisture levels high in the area.

Throughout the stand, underplant red oak, sugar maple, red maple, white birch, large-tooth aspen, striped maple, white pine, eastern hemlock, high-bush cranberry, beaked hazelnut, wild raisin, mountain holly, serviceberry, wood ferns, interrupted fern, cinnamon fern, bluebead lily, wild sarsaparilla, bunchberry, twinflower, and creeping snowberry.

Prune and release any good quality red oak and white birch.

Remove invasive and non-native species such as English oak, red ash, Manitoba maple and European linden.

STAND 13 **(23.39 acres - 9.47 hectares)**

DESCRIPTION

This section of the property was heavily farmed until sometime before 1935. Aerial photography shows sparse tree growth by 1935 with full forest cover by 1958. Old field white spruce originally dominated the canopy of the stand, however most have died and fallen over. The small percentage of the white spruce still standing are sparsely spread throughout the stand. Most of the old snags created by the dying spruce have since fallen, leaving almost no upper canopy throughout this stand. Without good nearby seed sources, the stand has been colonized primarily by short but fast-growing European mountain ash which grows densely throughout the stand. Some white birch and red maple can be found sparingly throughout the stand although most are multi-stemmed due to some harvesting in the past. The nearby properties and sunny conditions have also allowed a number of other non-native species to proliferate such as euonymus, false spirea, glossy buckthorn, Manitoba maple and English oak.

Although this stand could almost be considered a shrub forest, a number of young healthy native species were found growing on site, primarily white ash and red oak, as well as some red spruce. Although the stand is both dominated and defined by the large presence of European mountain ash, a number of other shrub species are found throughout including chokecherry, wild raisin, pin cherry, red-berried elder, alternate-leaf dogwood, high bush cranberry, and bayberry, as well as lots of various berry-producing canes. Even though there is a need for good interventions needed to restore this stand into a healthy forest, wildlife is abundant in the area, with signs of snowshoe hare, woodpeckers, and ruffed grouse found during the site visit.

TREATMENT

Removal of non-native species such as false spirea, English oak, glossy buckthorn, Manitoba maple and euonymus.

Drop any coarse woody debris so that is touching the ground to increase organic matter in the soil, create habitat for salamanders and other ground fauna, and improve water retention and absorption. Brush and log piles will be created to further improve habitat and to keep moisture levels high in the area.

Create small-micro patch cuts in the densest areas of European mountain ash to facilitate restoration plantings.

Underplant yellow birch, sugar maple, striped maple, American elm, white ash, white birch, white pine, eastern hemlock, red spruce, eastern white cedar, beaked hazelnut, winterberry holly, mountain holly, American fly honeysuckle, bush honeysuckle, witch hazel, serviceberry, clematis, sensitive fern, ostrich fern, interrupted fern, cinnamon fern, bluebead lily, bunchberry, starflower, wild sarsaparilla, cutleaf coneflower, swamp milkweed, Joe Pye weed, tall white aster, twinflower, and creeping snowberry.

Prune and release red oak, white ash, red maple, white birch, and red spruce. Prune larger multi-stemmed specimens to good health, generally eliminating all but one-three stems.

Install bird boxes to increase sites for cavity-nesting birds.

STAND 14 **(2.31 acres - 0.93 hectares)**

DESCRIPTION

This stand is an old field that has not been cultivated in a number of years. It has no true forest cover to speak of but it is currently beginning the process of returning to a forested area. A number of small white spruce and white birch as well as other first successional species are colonizing the field with the tallest being less than 12' high. Most of these pioneers are under 3' tall. Some shrubs are also beginning to colonize the area, however a lack of nearby seed sources combined with the harsh open conditions and the poor soil quality have limited species diversity. Parts of the field are covered in moss, which is never a sign of a fertile field. The field currently is covered by open field species of wildflowers such as goldenrods, St. John's wort, avens and a number of non-natives.

This stand can be considered a bit of a blank slate with a number of intervention options available. Without restoration work, this stand will continue to develop into a relatively non-diverse old field white spruce forest. Thoughtful plantings will help push this stand towards a healthy, diverse forest or create a forest for a more specific function such as an area of sugar maples to one day provide maple syrup. It could be also be farmed in the future, or become part of a teaching and interpretive area.

There were relatively few wildlife signs found during the site visit, other than song sparrows. However, meadow voles and other rodents, as well as a variety of field insects, are likely making homes throughout the field.

TREATMENT

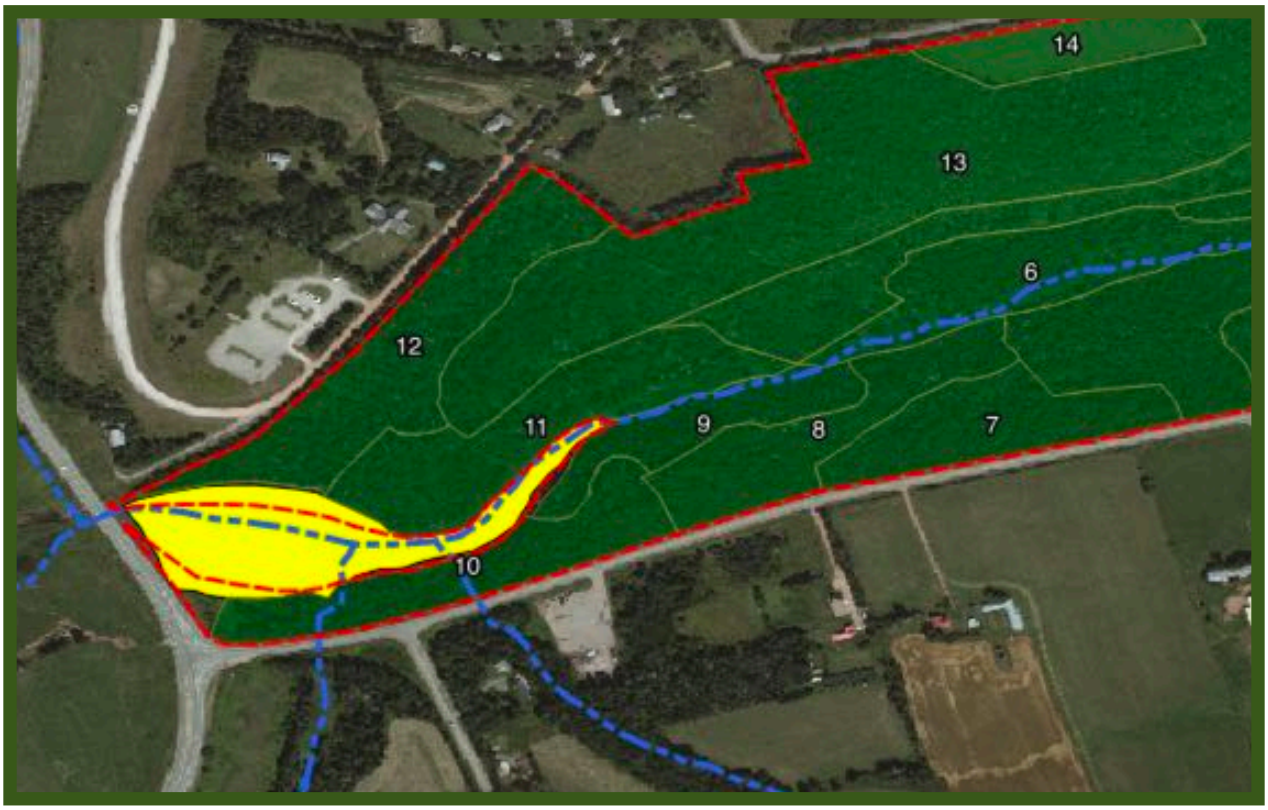
Prune white birch and white pine to ensure healthy growing patterns as they are out in full sun and will tend to be very widely-branched.

Remove non-native species such as Norway maple, English oak, Manitoba maple, false spirea and European mountain ash.

Coarse woody debris could be added throughout the site to improve soil health and improve wildlife habitat.

Restoration plantings will depend on what the planned function of this stand will be. However due to the open, sunny nature of site, the choice of choices should primarily concentrate on early successional options. If more shade loving species are planted then maintenance will have to be incorporated into yearly work. Species to be planted could include red maple, white birch, large-tooth aspen, white ash, red oak, eastern larch, white pine, eastern white cedar, wild rose, wild raisin, serviceberry, winterberry holly, black chokeberry, red chokeberry, common elder, choke cherry, bayberry, sweet fern, sweet gale, speckled alder, hawthorn, red-osier dogwood, round-leaf dogwood, staghorn sumac, American mountain ash, swamp milkweed, cutleaf coneflower, Joe Pye weed, fireweed, blue flag iris, blue-eyed grass, asters, sensitive fern and ostrich fern.

MARSH **(6.5 acres - 2.63 hectares)**



DESCRIPTION

Although this isn't an official "forest stand", the marsh present at the end of the property would benefit from some small interventions. It also presents a wonderful opportunity to restore a degraded eco-system, improve crucial wildlife habitat as well as provide a unique experiential habitat to explore increasing the tourism and educational potential of the Sir Andrew Macphail Homestead, Macphail Woods, and the Orwell Corner Historic Village.

The marsh is in relatively good health, lacking some of the invasive marshland species such as purple loosestrife and yellow iris. It is also in use by a number of wildlife species such as muskrat, kingfishers, brook trout, smelt, racoons and waterfowl. Water sampled near the Trans Canada Highway was slightly salty but towards the eastern section of marsh salt levels are very low if present at all.

The marsh demands less intervention then much of the rest of the property but would benefit from plantings of various rare and native wetland plants, these would also add to the potential educational and tourism benefits of this stand. Plantings of rare wetland plants would also help restore native populations, add to biodiversity, provide pollen, and improve food sources for a wide range of wildlife.

TREATMENT

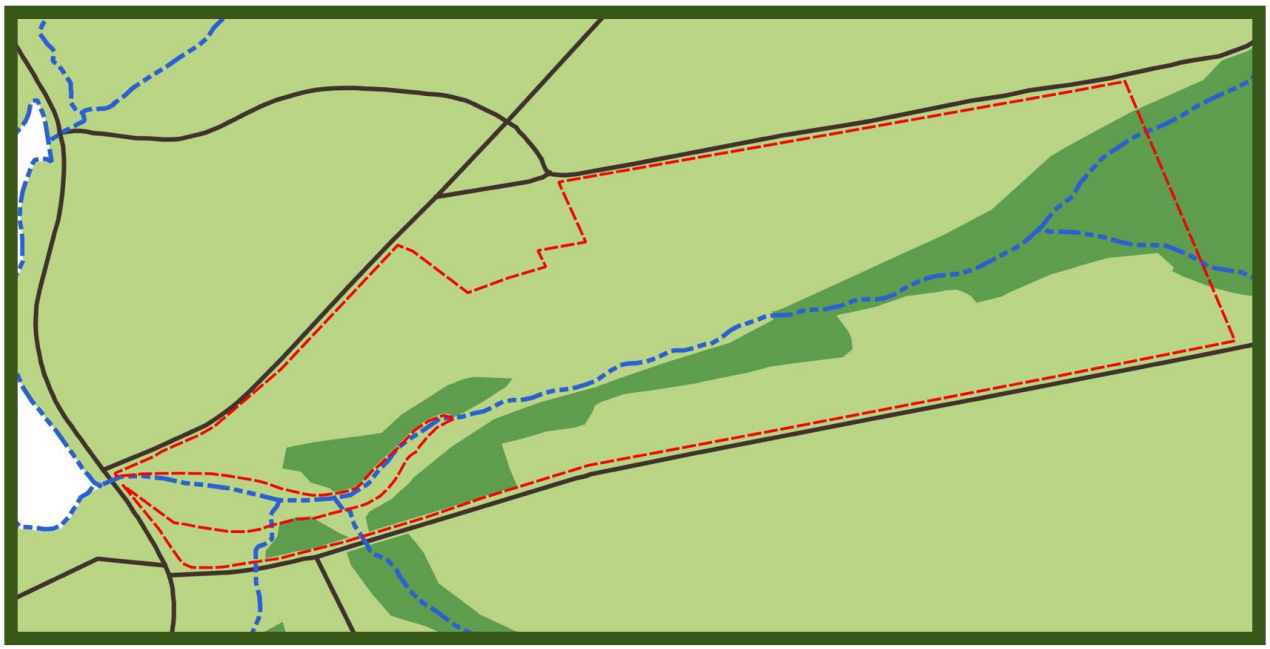
Care should be taken in enacting any work on this stand as riparian zones are ecologically sensitive and provide critical wildlife habitat.

This would be an interesting place to add Joe Pye weed, blue-flag iris, swamp milkweed, turtlehead, cattails, marsh cinquefoil and Canada anemone.

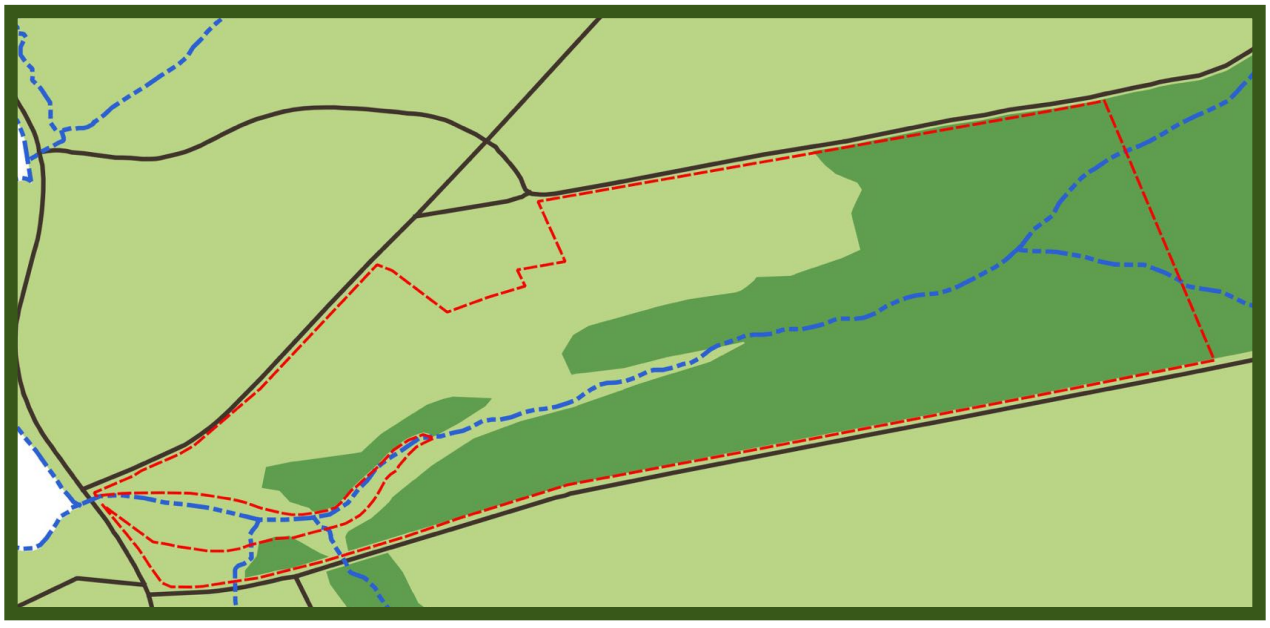
APPENDICES - ADDITIONAL MAPS & STAND TALLY SHEETS

1) FOREST COVER 1900
2) FOREST COVER 1935
3) FOREST COVER 1958
4) FOREST COVER 1980
5) AERIAL PHOTO 1935
6) AERIAL PHOTO 1958
7) AERIAL PHOTO 1974
8) AERIAL PHOTO 1990
9) STAND TALLY SHEETS

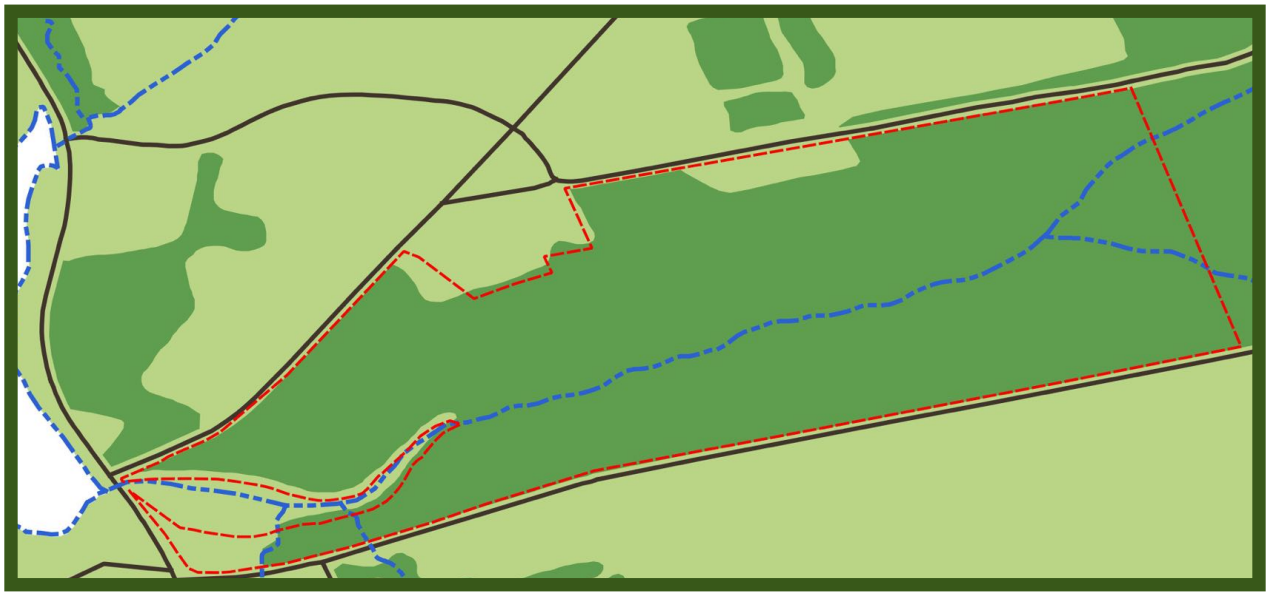
FOREST COVER 1900



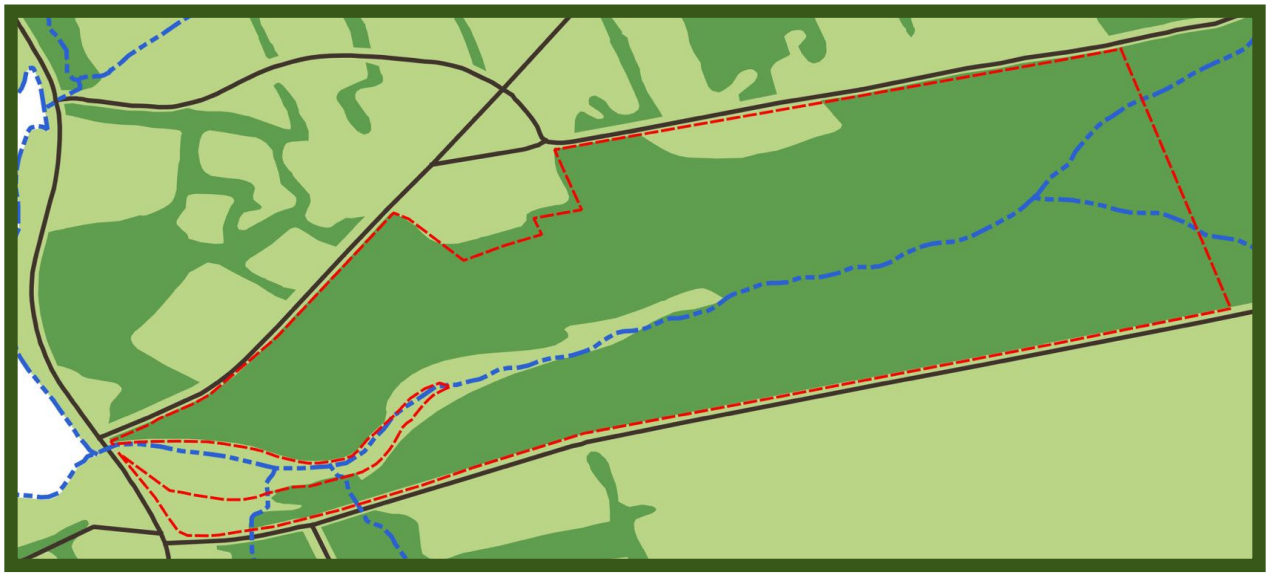
FOREST COVER 1935



FOREST COVER 1958



FOREST COVER 1980



AERIAL PHOTO 1935

AERIAL PHOTO 1958

AERIAL PHOTO 1974

AERIAL PHOTO 1990

Stand # 1 **Size:** 3.49 hectares - 8.63 acres

Origin: Old Field
Ploughed: Yes
Topography: Flat, slight slope south
Drainage: Medium
Watercourse: No

Tree Quality: Low to Medium
Even Aged: No
Maturity: Immature
Stocking: Under stocked

Canopy Description:

Sparse and patchy upper canopy of old spurce, with lower canopy of of red maples and balsam fir. Understory of European mountain ash

Tree Source: Seed 75% Stump sprout 25%

#1:	WS	**% :**	40	**Age:**	70+	**Diameter:**	31 cm	**Height:**	17.9 m
#2:	WB	**% :**	20	**Age:**	50+	**Diameter:**	27.2 cm	**Height:**	16.1 m
#3:	RM	**% :**	20	**Age:**	40+	**Diameter:**	14.9 cm	**Height:**	12.1 m

Regeneration: **#1:** BF **Ht:** 1 m **#2:** EMA **Ht:** <1 m **#3:** RM **Ht:** <1 m

Ground Cover: Leaf litter 20% Moss 50% Wildflower 20% Fern 10%

Light Reaching Forest Floor: Medium - High
Number of Snags: Medium
Quality of Snags: Medium
Amount of CWD: Medium
Size of CWD: Medium

Wildlife:

Yellow-bellied sapsucker signs, Ruffed grouse, Wildlife runs, racoon scat

Trees
trembling aspen
white birch
red maple
english oak
balsam fir
white spruce
yellow birch
Norway maple
white pine
eastern larch

Shrubs
pin cherry
red-berried elder
Highbush cranberry
European mountain ash
American fly honeysuckle
striped maple
mountain holly
Bayberry
Blueberry

Ferns and Others
Bracken fern
evergreen wood fern

Wildflowers
Bunchberry
Starflower
Veronica
Wild sarsaparilla
False lily of the valley
Clintonia
Sedge spp.
tall white aster
common ladyslipper

Notes:
Balsam Fir - 19.5 cm - 12.2 m

Tall white pines - 89.5 cm - 24.5 m

Stand # 2 **Size:** 1.77 hectares - 4.37 acres

Origin:	Partial Cut	**Tree Quality:**	Medium
Ploughed:	No	**Even Aged:**	No
Topography:	Slope towards River	**Maturity:**	Immature
Drainage:	Medium	**Stocking:**	Fully Stocked
Watercourse:	Yes		

Canopy Description:

Open patches along river, dense balsam fir canopy with yellow birch understory

Tree Source: Seed 80% Stumpe sprout 20%

#1:	BF	**% :**	40	**Age:**	70+	**Diameter:**	21.6 cm	**Height:**	18.9 m
#2:	YB	**% :**	40	**Age:**	70+	**Diameter:**	20.1 cm	**Height:**	16.4 m
#3:	WP	**% :**	10	**Age:**	120+	**Diameter:**	34.3 cm	**Height:**	21.6 m

Regeneration: **#1:** BF **Ht:** 1 m **#2:** RM **Ht:** 1 m **#3:** **Ht:**

Ground Cover: Leaf litter 40% Fern 40%

Light Reaching Forest Floor:	Low to High
Number of Snags:	Medium
Quality of Snags:	Medium
Amount of CWD:	Medium
Size of CWD:	Medium

Wildlife:

Blue jay, bald eagle, brook trout, yellow-bellied sapsucker, red squirrel, red back salamander, racoon prints,

Trees
red maple
white birch
yellow birch
red spruce
balsam fir
Norway maple
english oak
scotch elm
eastern hemlock
white pine
white spruce

Shrubs
European mountain ash
pin cherry
red-berried elder
Raspberry
chokecherry
mountain maple
Speckled alder
Highbush cranberry
currant spp.

Ferns and Others
mountain wood fern
Spinulose wood fern
ostrich fern
oak fern
new york fern
sensitive fern
crested wood fern
old man's beard
lady fern
beech fern
bolete

Wildflowers
Starflower
Veronica
Wild sarsaparilla
aster spp.
Spotted jewelweed
heal all
creeping buttercup
Canada gerrymander
wood sorrel
Dandelion

Wildflowers
grass spp.
common plantain
dewberry
shinleaf
curled dock
purple aster

Notes:
Some larger specimens of
red spruce
Red maple
white spruce

Larger Eastern Hemlocks
41.4 cm - 19.4 m

Stand # 3 **Size:** 2.55 hectares - 6.31 acres

Origin:	Partial Cut	**Tree Quality:**	High	**Canopy Description:**	
Ploughed:	No	**Even Aged:**	No		
Topography:	Sloping towards River	**Maturity:**	Mature	Tall canopy with shady to sometimes dappled light	
Drainage:	low to medium	**Stocking:**	Fully Stocked		
Watercourse:	Yes				

Tree Source: Seed 100%

#1:	HE	**% :**	20	**Age:**	150	**Diameter:**	78 cm	**Height:**	21.6 m
#2:	YB	**% :**	20	**Age:**	150	**Diameter:**	33.7 cm	**Height:**	21.6 m
#3:	WP	**% :**	20	**Age:**	150	**Diameter:**	81 cm	**Height:**	31.4 m

Regeneration: **#1:** RM **Ht:** 0.5m **#2:** RS **Ht:** <3m **#3:** HE **Ht:** <2m

Ground Cover: Leaf litter 40% Moss 20% Wildflower 5% Grass 5% Ferns 35%

Light Reaching Forest Floor:	Low
Number of Snags:	Medium
Quality of Snags:	Medium
Amount of CWD:	Medium
Size of CWD:	Medium to Large

Wildlife: barred owl, red back salamander, woodland jumping mouse, muskrat passage, racoon, black-throated green warbler, black and white warbler, ovenbird, northern parula, eastern wood pewee, vireos, red-breasted nuthatch, thrushes, kinglets, chickadees, mink, toad, wood frog, yellow spotted salamander, blue-spotted salamander, brook trout, mosquitos, belted kingfisher, woodpecker signs, bald eagle nest, blue jay, crows, blackburnian warblers, winter wren, northern junco,

Trees
red maple
yellow birch
eastern hemlock
white pine
red spruce
balsam fir
red oak
Norway maple
english oak

Shrubs
wild raisin
European mountain ash
mountain maple
Raspberry
american fly honeysuckle
currant spp.
ground hemlock
striped maple
Dewberry

Ferns and Others
new york fern
Ostrich fern
evergreen wood fern
mountain wood fern
polypore spp.
Lung lichen

Wildflowers
Bunchberry
Starflower
Veronica
false lily of the valley
wild sarsaparilla
wood sorrel
Creeping buttercup
spotted jewelweed
bittersweet nightshade
common plantain

Wildflowers
heal all
Canada Germander
avens spp.
aster spp.
Twinflower
goldthread
Dandelion
hemp nettle
curled dock

Notes:
Other notable larger tree species
Balsam fir
Red spruce

Larger Yellow Birches
48.2 cm - ~22 m

Stand # 4 **Size:** 4.39 hectares - 10.84 acres

Origin:	Partial Cut	**Tree Quality:**	Medium	**Canopy Description:**	
Ploughed:	No	**Even Aged:**	Yes		
Topography:	Sloping North	**Maturity:**	Immature to over	Dense predominantly Balsam Fir canopy with some deciduous pockets	
Drainage:	Medium	**Stocking:**	Fully Stocked		
Watercourse:	Yes				

Tree Source: Seed 70% stump sprout 15% root sprout 15%

#1:	BF	**% :**	60	**Age:**	50+	**Diameter:**	19.4 cm	**Height:**	16.9 m
#2:	WB	**% :**	15	**Age:**	70+	**Diameter:**	37 cm	**Height:**	20.2 m
#3:	TA	**% :**	15	**Age:**	50+	**Diameter:**	25 cm	**Height:**	21.4 m

Regeneration: **#1:** BF **Ht:** 1 m **#2:** RM **Ht:** 0.5 m **#3:** TA **Ht:** 1 m

Ground Cover: Leaf litter 40% Moss 30% Wildflower 15% Fern 15%

Light Reaching Forest Floor:	Low
Number of Snags:	Medium
Quality of Snags:	Medium
Amount of CWD:	High
Size of CWD:	Medium

Wildlife:

racoon scat, kinglets, chickadees, red-eye vireo, bluejay, red squirrel middens, wildlife runs

Trees
trembling aspen
white birch
grey birch
english oak
balsam fir
red maple
red spruce
white spruce
white pine

Shrubs
wild raisin
pin cherry
red-berried elder
Highbush cranberry
striped maple
american fly honeysuckle
european mountain ash
raspberry

Ferns and Others
Bracken fern
Mountain wood fern
hay-scented fern
Bolete
Old man's beard

Wildflowers
Bunchberry
Starflower
Clintonia
False lily of the valley
Veronica
wood sorrel
Bittersweet nightshade

Notes:
lots of blow down

Stand # 5 **Size:** 3.6 hectares - 8.9 acres

Origin:	Clearcut	**Tree Quality:**	low to medium	**Canopy Description:**	
Ploughed:	Yes	**Even Aged:**	No		
Topography:	Flat	**Maturity:**	Immature		short and dense with European mountain ash, taller trees are sparse
Drainage:	Medium	**Stocking:**	Fully Stocked		
Watercourse:	No				

Tree Source: Seed 50% stump sprout 20% root sprout 30%

#1:	TA	**% :**	30	**Age:**	40	**Diameter:**	9.6 cm	**Height:**	9.8 m
#2:	EMA	**% :**	25	**Age:**	25+	**Diameter:**	13 cm	**Height:**	8.4 m
#3:	WB	**% :**	20	**Age:**	50+	**Diameter:**	25.1 cm	**Height:**	14.3 m

Regeneration: **#1:** BF **Ht:** 3 m **#2:** EMA **Ht:** 2 m **#3:** RM **Ht:** 2 m

Ground Cover: Leaf litter 10% Moss 10% Wildflower 50% Grass 5% Fern 25%

Light Reaching Forest Floor:	Medium to High
Number of Snags:	Medium
Quality of Snags:	Medium
Amount of CWD:	Medium
Size of CWD:	Medium

Wildlife:

red eye vireo, blue jay, black-throated green warbler, black-capped chickadee, sapsucker signs, wildlife runs, Viburnum beetle, kingfisher, black and white warbler

Trees
trembling aspen
white birch
grey birch
english oak
balsam fir
white spruce
red maple
Norway maple
European linden
eastern larch
Red ash
red oak

Shrubs
wild raisin
European mountain ash
red-berried elder
blueberry
raspberry
Blackberry
American fly honeysuckle
mountain holly

Ferns and Others
Bracken fern
Spinulose wood fern
Mountain wood fern
cinnamon fern
hay-scented fern
old man's beard
amanita spp.

Wildflowers
Bunchberry
Starflower
Veronica
Clintonia
wild sarsaparilla
wild strawberry
twinflower
false lily of the valley
Rough stemmed goldenrod
Narrow leaf goldenrod

Wildflowers
fireweed
whorled wood aster
Canada goldenrod

Notes:
Some larger WS and TA in pockets
WS - 5% - 25 cm - 17.5 m
RM - 15% - 11.2 cm - 11.6 m
BF - 5% - 12.3 cm - 9.4 m

Hedgelike WS along Kinross Rd.

Stand # 6 **Size:** 2.03 hectares - 5.01 acres

Origin:	Partial Cut	**Tree Quality:**	Low	**Canopy Description:**	
Ploughed:	No	**Even Aged:**	Yes		
Topography:	Slope towards River	**Maturity:**	Over Mature	Dense with BF although sunny pockets along river	
Drainage:	Low to Medium	**Stocking:**	Fully Stocked		
Watercourse:	Yes				

Tree Source: Seed 90% Stump sprout 10%

#1:	BF	**% :**	60	**Age:**	40+	**Diameter:**	19.3 cm	**Height:**	17.1 m
#2:	WS	**% :**	25	**Age:**	70+	**Diameter:**	30 cm	**Height:**	17.8 m
#3:	RM	**% :**	10	**Age:**	60+	**Diameter:**	19.4 cm	**Height:**	16.3 m

Regeneration: **#1:** BF **Ht:** 1 m **#2:** RM **Ht:** 1 m **#3:** WS/RS **Ht:** 1 m

Ground Cover: Leaf litter 15% Moss 35% Wildflower 10% Fern 35%

Light Reaching Forest Floor:	Low to Medium
Number of Snags:	High
Quality of Snags:	Low to Medium
Amount of CWD:	High
Size of CWD:	Medium to Large

Wildlife:

Black-capped chickadee, bald eagle, brook trout, smelt, muskrat passage, beaver, kingfisher, red squirrel, red-breasted nuthatch, woodpecker signs, mink, sapsucker, blue jay, racoon, crow, gulls

Trees
trembling aspen
white birch
red maple
english oak
balsam fir
white spruce
yellow birch
norway maple
butternut
red oak
red ash
red spruce
eastern larch
apple spp.
European linden
Manitoba maple

Shrubs
wild raisin
European mountain ash
red-berried elder
mountain maple
alternate leaf dogwood
highbush cranberry
striped maple
ground hemlock
speckled alder
American fly honeysuckle

Ferns and Others
Bracken fern
Spinulose wood fern
evergreen wood fern
interrupted fern
lady fern
Ostrich fern
oak fern
Mountain wood fern
Beech fern
old man's beard

Wildflowers
Bunchberry
Starflower
Veronica
wild sarsaparilla
Fireweed
false lily of the valley
Canada goldenrod

Wildflowers
Rough stemmed goldenrod
narrow leaf goldenrod
Curled dock
tall white aster
grass spp.
Spotted jewelweed
heal all
creeping buttercup
Canada gerrymander
bittersweet nightshade

Wildflowers
red clover
dandelion
wood sorrel
meadow rue spp.
Hemp nettle
avens spp.

Notes:
Regeneration of NM, YB, RO

Stand # 7 **Size:** 1.6 hectares - 3.95 acres

Origin:	Clearcut	**Tree Quality:**	Low to Medium	**Canopy Description:**	
Ploughed:	Yes	**Even Aged:**	No		
Topography:	Flat	**Maturity:**	Mature	Mixed canopy with patchy EMA understory, some sunnier areas of blow down.	
Drainage:	Medium	**Stocking:**	Fully Stocked		
Watercourse:	No				

Tree Source: Seed 80% Stump sprout 20%

#1:	BF	**% :**	35	**Age:**	40+	**Diameter:**	16.8 cm	**Height:**	13.4 m
#2:	WB	**% :**	30	**Age:**	40+	**Diameter:**	29.1 cm	**Height:**	17.5 m
#3:	WS	**% :**	25	**Age:**	70+	**Diameter:**	26.2 cm	**Height:**	19.3 m

Regeneration: **#1:** BF **Ht:** 1 m **#2:** EMA **Ht:** 2 m **#3:** RM **Ht:** 1 m

Ground Cover: Leaf litter 45% Moss 15% Wildflower 15% Fern 15% Seedlings 10%

Light Reaching Forest Floor:	Low to Medium
Number of Snags:	Medium
Quality of Snags:	Low
Amount of CWD:	High
Size of CWD:	Medium

Wildlife:

Red squirrel, blue jay, viburnum beetle, bumblebee nest

Trees
red maple
white birch
American beech
Red spruce
balsam fir
white spruce
red ash
english oak
Norway maple
Apple app.

Shrubs
wild raisin
European mountain ash
beaked hazelnut
blueberry
raspberry
serviceberry
highbush cranberry

Ferns and Others
Mountain wood fern
evergreen wood fern

Wildflowers
Bunchberry
Starflower
Veronica
hawkweed spp.
Pyrola spp.
creeping buttercup
sedge spp.

Notes:
Red maple 10% - 22.3 cm - 17.4 m

Stand # 8 **Size:** 1.7 hectares - 4.21 acres

Origin:	Partial Cut	**Tree Quality:**	Medium
Ploughed:	No	**Even Aged:**	No
Topography:	Slope near river	**Maturity:**	Immature - Mature
Drainage:	Medium	**Stocking:**	Fully Stocked
Watercourse:	No		

Canopy Description:

Primarily deciduous north facing canopy with dappled light

Tree Source: Seed 60% Stump Sprout 40%

#1:	RM	**% :**	40	**Age:**	50+	**Diameter:**	24.1 cm	**Height:**	18.8 m
#2:	YB	**% :**	35	**Age:**	75+	**Diameter:**	19.5 cm	**Height:**	19.2 m
#3:	WB	**% :**	20	**Age:**	50+	**Diameter:**	23.9 cm	**Height:**	19.2 m

Regeneration:	**#1:**	BF	**Ht:**	2 m	**#2:**	RM	**Ht:**	6”	**#3:**	RO	**Ht:**	1 m

Ground Cover: Leaf litter 45% Moss 5% Wildflower 10% Fern 40%

Light Reaching Forest Floor:	Low to Medium
Number of Snags:	Low
Quality of Snags:	Medium
Amount of CWD:	Medium
Size of CWD:	Medium

Wildlife:

Woodpecker signs, raven, northern flicker signs

Trees
Red maple
white birch
Yellow birch
english oak
balsam fir
white spruce
red spruce
red oak

Shrubs
wild raisin
pin cherry
European mountain ash
blueberry
striped maple

Ferns and Others
Bracken fern
Mountain wood fern
evergreen wood fern
cinnamon fern
hay-scented fern
new york fern
Spinulose wood fern
Bolete

Wildflowers
Bunchberry
Starflower
wild sarsaparilla
false lily of the valley
Dandelion
wild strawberry
Dewberry
hawkweed spp.

Notes:

Stand # 9 **Size:** 1.14 hectares - 2.81 acres

Origin:	Partial	**Tree Quality:**	Low to Medium	**Canopy Description:**	
Ploughed:	No	**Even Aged:**	No		
Topography:	Heavy slope to north	**Maturity:**	Mature	Closed dense coniferous canopy with north facing slope	
Drainage:	Low	**Stocking:**	Fully Stocked		
Watercourse:	Yes				

Tree Source: Seed 100%

#1:	BF	**% :**	50	**Age:**	60+	**Diameter:**	21.6 cm	**Height:**	17.4 m
#2:	WS	**% :**	25	**Age:**	70+	**Diameter:**	34.3 cm	**Height:**	20.7 m
#3:	RS	**% :**	25	**Age:**	100+	**Diameter:**	41.2 cm	**Height:**	21 m

Regeneration: **#1:** BF **Ht:** 1 m **#2:** RS **Ht:** 1 m **#3:** RO **Ht:** 1 m

Ground Cover: Leaf litter 40% Moss 40% Ferns 10% Seedings 10%

Light Reaching Forest Floor:	Low
Number of Snags:	Medium
Quality of Snags:	Medium
Amount of CWD:	Medium
Size of CWD:	Medium

Wildlife:

Wildlife runs, red squirrel, crows, blue jay, black capped chickadee fox scat

Trees
white birch
red spruce
yellow birch
red oak
black spruce
balsam fir
white spruce

Shrubs
European mountain ash
red-berried elder

Ferns and Others
Mountain wood fern
moss spp.

Wildflowers
Veronica
wood sorrel
hemp nettle

Notes:

Stand # 10 **Size:** 1.8 hectares - 4.44 acres

Origin: Partial cut
Ploughed: No
Topography: medium slope north
Drainage: Medium
Watercourse: Marsh

Tree Quality: Low to Medium
Even Aged: No
Maturity: Mature
Stocking: Fully Stocked

Canopy Description:

Patchy canopy of mixed deciduous and coniferous trees with dense patches of balsam fir and white spruce understory. North facing.

Tree Source: Seed 60% Stump sprout 10% Root sprout 30%

#1:	EL/WS	**% :**	40	**Age:**	50+	**Diameter:**	30.4 cm	**Height:**	19.4 m
#2:	TA	**% :**	25	**Age:**	40+	**Diameter:**	23.9 cm	**Height:**	18.8 m
#3:	WB	**% :**	25	**Age:**	40+	**Diameter:**	22.9 cm	**Height:**	18.4 m

Regeneration: **#1:** BF **Ht:** 2 m **#2:** BS **Ht:** 1 m **#3:** TA **Ht:** 1 m

Ground Cover: Leaf litter 60% Moss 10% Wildflower 10% Grass 5% Fern 10%

Light Reaching Forest Floor: Low to Medium
Number of Snags: Low
Quality of Snags: Low
Amount of CWD: Low to Medium
Size of CWD: Small to Medium

Wildlife:

Carpenter ants, blue jay, woodpecker signs, red squirrel, viburnum beetle, crows, racoon scat, wildlife runs

Trees
trembling aspen
white birch
red maple
english oak
balsam fir
American beech
red oak
white spruce
eastern larch
Large tooth aspen

Shrubs
wild raisin
pin cherry
red-berried elder
Chokecherry
ground hemlock
European mountain ash
Serviceberry
Raspberry

Ferns and Others
Bracken fern
mountain wood fern
evergreen wood fern
hay-scented fern
sensitive fern
Bolete spp.

Wildflowers
Bunchberry
Starflower
Veronica
hawkweed spp.
aster spp.
wild sarsaparilla
false lily of the valley
dewberry
Baneberry
creeping buttercup

Wildflowers
narrow leaf goldenrod
Canada gerrymander
dandelion
Canada goldenrod
bittersweet nightshade

Notes:
more larch in western portion

Some scattered RM - 19.2 cm - 18.3 m

Stand # 11 **Size:** 2.36 hectares - 5.84 acres

Origin:	Clearcut	**Tree Quality:**	Low to Medium
Ploughed:	Yes	**Even Aged:**	No
Topography:	Flat with slope near river	**Maturity:**	Mature
Drainage:	Medium	**Stocking:**	Understocked
Watercourse:	Yes		

Canopy Description:

Sparse upper canopy with dense under canopy, south facing.

Tree Source: Seed 60% Stump sprout 40%

#1:	WS	**% :**	30	**Age:**	70+	**Diameter:**	42.1 cm	**Height:**	18.4 m
#2:	RM	**% :**	30	**Age:**	40+	**Diameter:**	18.1 cm	**Height:**	14.2 m
#3:	WB	**% :**	20	**Age:**	40+	**Diameter:**	17.9 cm	**Height:**	13.6 m

Regeneration: **#1:** EMA **Ht:** 2 m **#2:** RM **Ht:** 1 m **#3:** TA **Ht:** 1 m

Ground Cover: Moss 30% Wildflowers 30% Ferns 40%

Light Reaching Forest Floor:	Medium
Number of Snags:	Medium
Quality of Snags:	Medium
Amount of CWD:	Medium
Size of CWD:	Medium

Wildlife:

Bald Eagle, Black capped chickadee, red squirrel, wildlife runs

Trees
trembling aspen
white birch
red maple
yellow birch
balsam fir
red oak
white spruce

Shrubs
European mountain ash
red-berried elder
alternate leaf dogwood
Willow
chokecherry
speckled alder
raspberry
blackberry
High bush cranberry

Ferns and Others
hay-scented fern
Mountain wood fern
Cinnamon fern

Wildflowers
Dewberry
Starflower
Veronica
hawkweed spp.
wild sarsaparilla
false lily of the valley
Lions paw
Canada goldenrod
creeping buttercup

Notes:
TA - 10% - 20.4 cm - 15.1 m

Stand # 12 **Size:** 2.71 hectares - 6.71 acres

Origin:	Old field	**Tree Quality:**	Low	**Canopy Description:**	
Ploughed:	Yes	**Even Aged:**	Yes		
Topography:	Flat	**Maturity:**	Overmature	Sparse with areas of dead or fallen spruce	
Drainage:	Medium	**Stocking:**	Understocked		
Watercourse:	Marsh				

Tree Source: Seed 60% root sprout 30%

#1:	WS	**% :**	70	**Age:**	50+	**Diameter:**	19.2 cm	**Height:**	15.2 m
#2:	EMA	**% :**	15	**Age:**	25+	**Diameter:**	17.6 cm	**Height:**	21.3 m
#3:	TA	**% :**	10	**Age:**	40+	**Diameter:**	18.9 cm	**Height:**	18.8 m

Regeneration: **#1:** EMA **Ht:** 3 m **#2:** RO **Ht:** 1 m **#3:** **Ht:**

Ground Cover: Leaf litter/CWD 20% Moss 20% Wildflowers 30% Ferns 30%

Light Reaching Forest Floor:	Medium
Number of Snags:	Medium
Quality of Snags:	Medium
Amount of CWD:	High
Size of CWD:	Medium

Wildlife:

Vireos, black-cap chickadees, Yellow-rumped warbler, goldfinch, black-throated green warbler, blue jay, woodpecker signs, junco, red squirrel, cedar waxwings

Trees
trembling aspen
white birch
red ash
english oak
white spruce
red oak
eastern larch
European linden
Manitoba maple

Shrubs
wild rose
pin cherry
red-berried elder
Willow spp.
European mountain ash
speckled alder
Raspberry
Blackberry
chokecherry
winterberry holly
American fly honeysuckle
highbush cranberry

Ferns and Others
sensitive fern
Mountain wood fern

Wildflowers
Veronica
Starflower
Canada germander
hawkweed spp.
Canada goldenrod
Aster spp.
bittersweet nightshade
dewberry
wild strawberry
hemp nettle

Wildflowers
Rough stem goldenrod
narrow leaf goldenrod
dandelion
violet spp.
creeping buttercup

Notes:
WB - 5% - 22.9 cm - 18.6 m

Stand # 13 **Size:** 9.47 hectares - 23.39 acres

Origin:	Old field	**Tree Quality:**	Low	**Canopy Description:**	
Ploughed:	Yes	**Even Aged:**	Yes		
Topography:	Flat	**Maturity:**	Immature	Low and dense with EMA	
Drainage:	Medium	**Stocking:**	Under Stocked		
Watercourse:	No				

Tree Source: Stump Sprout 20% Seed 80%

#1:	EMA	**% :**	80	**Age:**	15+	**Diameter:**	5 cm	**Height:**	6.7 m
#2:	WB	**% :**	10	**Age:**	30+	**Diameter:**	26.4 cm	**Height:**	11.2 m
#3:	WS	**% :**	10	**Age:**	40+	**Diameter:**	25.5 cm	**Height:**	12.4 m

Regeneration: **#1:** EMA **Ht:** 1 m **#2:** BF **Ht:** 1 m **#3:** EO **Ht:** 1 m

Ground Cover: Leaf litter 20% Moss 20% Wildflowers 10% Grass 20% Ferns 20% Seedlings 10%

Light Reaching Forest Floor:	Medium to High
Number of Snags:	Low
Quality of Snags:	Low
Amount of CWD:	Medium
Size of CWD:	Medium

Wildlife:

Sapsucker signs, snowshoe hare feeding signs, black capped chickadee, goldfinch, ruffed grouse

Trees
red maple
white birch
red oak
english oak
balsam fir
white ash
red spruce
white spruce
eastern larch
Manitoba maple
apple spp.

Shrubs
wild raisin
pin cherry
red-berried elder
European mountain ash
chokecherry
Glossy buckthorn
false spirea
Highbush cranberry
alternate leaf dogwood
Raspberry
bayberry
Euonymus spp.

Ferns and Others
evergreen wood fern
hay-scented fern
cinnamon fern
old man's beard
Polypore

Wildflowers
Veronica
Wild strawberry
Fireweed
hawkweed spp.
Canada goldenrod
Meadow rue spp.
Narrows leaf goldenrod
Rough stemmed goldenrod
avens spp.
aster spp.

Wildflowers
bittersweet nightshade
heal all

Notes:
Large WB - 46.2 cm - 23.6 m

Larger RO - 39.5 cm - 18.7 m

Stand # 14 **Size:** 0.93 hectares - 2.31 acres

Origin:	Old Field	**Tree Quality:**	Medium	**Canopy Description:**	
Ploughed:	Yes	**Even Aged:**	Yes		
Topography:	Flat	**Maturity:**	Immature	Open	
Drainage:	Medium to High	**Stocking:**	Under Stocked		
Watercourse:	No				

Tree Source: Seed 100%

#1:	WB	**% :**	50	**Age:**	<10	**Diameter:**	3.5 cm	**Height:**	3.6 m
#2:	WS	**% :**	50	**Age:**	<10	**Diameter:**	2.6 cm	**Height:**	2.4 m

Regeneration:	**#1:**	WS	**Ht:**	1 m	**#2:**	WB	**Ht:**	1 m	**#3:**	01	**Ht:** 01

Ground Cover: Wildflower 60% Grass 40%

Light Reaching Forest Floor:	High
Number of Snags:	None
Quality of Snags:	Low
Amount of CWD:	None
Size of CWD:	Small

Wildlife:

Song sparrow, meadow vole,

Trees
white birch
grey birch
english oak
Norway maple
white spruce
white pine
eastern larch

Shrubs
European mountain ash
willow spp.
speckled alder
Raspberry
false spirea

Ferns and Others

Wildflowers
pearly everlasting
Canada germander
narrow leaf goldenrod
Canada goldenrod
Rough stem goldenrod
purple vetch
st john's wart spp.
red clover
hawkweed spp.
avens spp.

Wildflowers
purple aster
cinquefoil spp.
evening primrose

Notes:

Stand # Marsh **Size:** 2.63 hectares - 6.5 acres

Origin: Marsh
Ploughed: No
Topography: Flat
Drainage: Low
Watercourse: Yes

Tree Quality:
Even Aged:
Maturity:
Stocking:

Canopy Description:

Open

01

Wildlife:

Belted kingfish, muskrat, old beaver signs, gold finch, racoon tracks, American black ducks,

Trees
red ash

Shrubs
speckled alder
Chokecherry
willow spp.

Ferns and Others
sensitive fern
Spinulose wood fern

Wildflowers
Marsh grasses spp.
fireweed
Cattails spp.
Meadow rue spp.
rough stem goldenrod
Canada goldenrod
narrow leaf goldenrod
purple aster
bittersweet nightshade
Canada thistle

Wildflowers
Curled dock
creeping buttercup
Hemp nettle
spotted jewelweed
bindweed spp.
horsetail spp.

Notes:
Water still fresh at halfway

Only slightly salty near HWY