

# Forest Assessment

## Prepared for Summer Village of Jarvis Bay



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## INTRODUCTION

Summer Village of Jarvis Bay participated in a Forest Assessment Project supported by AREF and ASVA to evaluate the current state of the forest within their environmental and natural reserves. **The Forest Assessment was completed on April 21, 2022.**

### Scope of Work

- 1) Collect field data and background information on current state of forest.
- 2) Develop tree/forest assessment, including the following key components:
  - a) Tree species description
  - b) Forest health assessment
  - c) Forest biodiversity and succession assessment
  - d) Estimate of forest floor fuel load for fire protection purposes
  - e) Pest identification
- 3) Provide recommendations
- 4) The work excluded tree assessment on private property.

### Goal

The goal of this assessment is to provide an assessment of the current state of trees and forest (health, vigor, biodiversity, risks) and provide options for management of a forest. Proper management will result in sustainable, resilient, and diversified forest vegetation. This work will also support the community's desire to meet the environmental and conservation objectives of their Municipal Development Plan (MDP)

### Objectives

- Evaluate and record the current tree/forest structures and healthy.
- Evaluate wood fuel load and risk of forest fires.
- Identify potential management activities such as harvesting, tree planting, fire suppression and disease management to improve forest.
- Identify potential management of biodiversity in area.

## LAND DESCRIPTION

### Location

Summer Village of Jarvis Bay is an incorporated municipality located on the east side of Sylvan Lake. The summer village shares a border with the Town of Sylvan Lake and stretches approximately 2.5 kilometers north along the lake shore. The summer village is located within County of Red Deer.

### History of Property

The Summer Village of Jarvis Bay is fortunate to have a well-planned municipal reserve and open space system, which was an integral part of the original subdivision design and designated as Natural/Environmental Reserve. These public areas are for both passive and active recreation. In addition, there is municipal reserve area along the lakeshore between the lake and the residents' property.

The Summer Village of Jarvis Bay was incorporated on January 1, 1986. The circa 1949-51 aerial photograph below shows several key features of the Summer Village. There was road allowance along the lake that went through the Summer Village. The summer village was forested areas dominated by a younger forest.



Picture 1. Orth photos of Summer Village of Jarvis Bay circa 1949-51

## FOREST DESCRIPTION & AREA SPECIFIC RECOMMENDATIONS

Summer Village of Jarvis Bay is within the Boreal Forest Natural region and within the Dry Mixedwood Subregion. Because of its transitional location and relatively disturbed habitat, this part of the Dry Mixedwood Boreal Subregion supports a medium diversity of plant and animal life. This ecological subregion has been called the most productive of the boreal subregions for wildlife, mainly because of the diversity of habitats available within it and productive shrub growth.

Summer Village of Jarvis Bay is surrounded by forested land on the north side, which is Jarvis Bay Provincial Park. The remaining area of the summer village is surrounded by agricultural land. Mixed wood of aspen and balsam poplar are the dominant forest types. There are no signs of previous forest fires within the Summer Village of Jarvis Bay. Photo below from 1908, shows a small steam sawmill using balsam poplar and aspen logs to produce lumber. Dense aspen/balsam poplar forest is showing in background.



Picture 2 : " "Sawmill at Jarvis Bay, Sylvan Lake, Alberta.", 1908, (CU1108586) by Unknown. Courtesy of Libraries and Cultural Resources Digital Collections, University of Calgary "

The Summer Village is dominated by a relatively even-aged aspen and mixedwood forest stands with access to water nearby and could be considered to have medium to high biodiversity. In general, the age of Summer Village of Jarvis Bay forest can be classified into 2 distinct age structures with the majority of

the forested at the mature stage. A mature forest is between 60-85 years of age and young forest is between 1-20 years old.

As an entire forest area, not including vegetation on private property, the area is dominated by aspen (90%) and relatively small percentages of balsam poplar (10%), and a few scattered white spruce trees. White spruce is the dominant tree species in the residential area.

Along with the natural tree and shrub species in the forest, many non-native tree and shrub species have been introduced in the public areas, as well as in the residential areas. The non-native trees and shrubs observed during the assessment include: Scots, Blue and Colorado spruce, Manitoba maple, a variety of willows, hybrid poplars, ash, elm, birch, crabapples, hawthorns, lilacs and many other ornamental shrub species. Caragana is also present. It is a non-native aggressive shrub species spreading throughout the village and natural areas.

The forested area is divided into two major forest stands: Open space/Road allowance, and Private Property-Residential Area. Forest and trees on private property are not part of the assessment but were observed from the roadside and are briefly described below.

## Open Space/ Road Allowance

**Forest:** Mature aspen/balsam poplar

**Forest type:** Aspen and balsam poplar even-aged stand

**Tree species mix:** 70% aspen, 25% balsam poplar, 4% spruce and 1% birch

**Age:** This stand is between 60 and 85 years old with many young aspen trees in understory of large trees

**Average Height:** aspen is between 40 and 50 feet

**Average DBH:** aspen 6 to 10 inches in DBH

**Understory vegetation:** there is variety of the understory plants including hazelnut, the dominant shrub species, followed by dogwood, willow, prickly rose, chokecherry and pin cherry.

The forest along the road allowance ranges from young to mature and is relatively healthy. However, there are a number of aspen and balsam poplar that are dead or dying. There are also some areas with dead wood material (DWM) laying on the forest floor.

Tree density is declining with several open areas that have a lower tree density. Some selective harvesting could be done to remove overmature dead and dying aspen and balsam poplars. In the next 5 to 20 years, one could expect that this stand would be naturally replaced with younger aspen/balsam poplar complemented with understory planting of coniferous trees.

There are approximately 5 white spruce trees in this stand. The age is variable ranging from 10 to 35 years old. There are a few mature Paper Birch that are very healthy. There are no signs of any previous forest fires. There were several signs of insect or disease problems in aspen/balsam poplar trees; i.e., trunks broken or fully breaking up.

### Recommendations/Suggestions:

- Removal of decadent and dying trees especially trees that pose risks to people and property
- Removal of caragana in understory
- Remove Dead Wood Material (DWM) to reduce potential of ground forest fires. You could mulch some of the DWM or just remove it all from the forest
- Introduce coniferous species in understory. Plant trees such as white spruce and balsam fir in the understory and tamarack and pine in open area. This will increase the biodiversity in the ecosystem.
- Selective harvest a few healthy aspen and balsam poplar to create open areas to promote suckering and natural regeneration
- If this stand is left alone to natural succession; in the future the aspen/balsam poplar will decline and the open area will be occupied by shrubs. This can create significant problems for the future regeneration of a forest.
- New and healthy young forest established by suckering and tree planting will benefit many wildlife species as they prefer a younger forest
- Younger forests also have a tendency to reduce potential unwanted invasive species in the ecosystem



Picture 3: Forest is dominated by mature aspen/balsam poplar with white spruce

## Riparian Areas

"Riparian Area refers to any land that adjoins or directly influences a water body. They are the place where water and land meet and interact and provide crucial ecosystems services valuable to all Albertans"<sup>1</sup>.

Riparian habitats are important in the ecology of a variety of fish and wildlife species. Forested riparian areas are important because they often provide a combination of water, forage and cover. Naturally vegetated riparian areas increase the value of water for fish by stabilizing shorelines.

They also reduce the amount of sediment that goes into ponds, lakes and streams. Sediment can damage spawning habitat, which can reduce spawning success and lead to lower fish populations. Shoreline vegetation also provides shaded areas that can reduce heat stress in fish.

Riparian area is also an extremely important wintering habitat for wildlife as they often have abundant forage and cover. Consequently, these areas are highly important to a variety of wildlife species.

Summer Village of Jarvis Bay needs to know that water and watersheds are defined in law as a public resource. All activities around water or adjacent to water bodies may require approval from government agencies. In Alberta, the Water Act regulates all activities related to water. Please see more information on: <https://www.alberta.ca/water-legislation-and-guidelines.aspx>

### Recommendations/Suggestions:

- Consider long term plan for restoration of riparian area by using Alberta Environment "Stepping Back from Water"<sup>1</sup> guide for Riparian area,
- The Alberta Riparian Habitat Management Society, also known as "Cows and Fish", can also provide expertise on for management of riparian areas



## **Private Property – residential area**

This area is not part of the project and specific data collection was not performed. However, based on observations collected from public roads and walking through the forest on undeveloped/vacant lot properties. The residential area can be developed into two categories: developed and undeveloped area (vacant lots). These undeveloped areas might also be the Connectivity and Conservation areas identified in the Jarvis Bay Municipal Development Plan (MDP). Additional work could be done with a Jarvis Bay representative to confirm the ownership and classification of the undeveloped areas. The maps provided for this Forest Assessment did not clearly identify the ownership or use of these areas.

The observation on developed residential area is that aspen and spruce are dominant tree species in the residential area. The age of white spruce tree is variable but most of them are planted in late 1960's or early 1970's. Aspen/balsam poplar correspond with the age, vigor and health as witnessed in natural areas. There are a few other species on private properties. Those observed included Scots Pine, Colorado Blue spruce, cedar, Mayday, Paper Birch, Manitoba maple, willows, few ash trees and Swedish aspen. Shrub vegetation is dominated by non-native shrubs.

The observation on undeveloped or vacant lots in the residential area at the corner of Jarvis Glen Way and Jarvis Bay Dr and the vacant lots along Jarvis Bay Drive, is that aspen and balsam polar are the dominant tree species in these locations. The aspen/balsam poplar correspond with the age, vigor and health as witnessed in natural areas. However, within those locations, there is a significant amount of dead and dying standing trees and significant amounts of dead wood material ( DWM) laying on forest floor. As mentioned earlier, further work could be done to determine if the summer village has any responsibility for these areas. There is a risk hazard present in these areas and it was observed that people are actively using them.

Many of the open areas are dominated by shrub with a few young aspen. It was also noted that many trees are infested by a variety of insects and diseases, dominated by poplar borers, aspen trunk conk, Hypoxylon canker and variety of trunk rotting fungi.

### **Recommendations/Suggestions:**

- Proper tree hazard risk assessment of mature and large trees in close proximity to houses and buildings should be considered.
- Remove Dead Wood Material (DWM) to reduce potential of ground forest fires
- There are many trees under powerlines where the top of tree has been removed and this reduces the longevity of trees. Replacement shrubs or medium size trees that will not reach a powerline are recommended.
- Selective harvest a few healthy aspen and balsam poplar to create open areas to promote suckering and natural regeneration
- If this stand is left alone to natural succession; further aspen/balsam poplar will decline and an open area will be occupied by shrubs. This can create significant problems for the future regeneration of a forest.
- Develop a tree catalog for the summer village. This catalog will help summer village managers and the general public choose the appropriate trees for the area

- Introduction of non-native trees and shrubs could have a negative impact on the natural forest vegetation in the area. Residents should carefully consider what they plant on their property.
- Avoid introducing ANY invasive tree or shrub species such as caragana, Russian olive, common buckthorn, salt cedar just to name a few.
- Education - Residents understanding how a forest functions will greatly help achieve overall goals and objectives. Include information on how to properly prune trees.



Picture 4: White and Colorado spruce is most dominant on private property ( L ); decadent and dying aspen/balsam poplars on vacant lots

## ADDITIONAL RECOMMENDATIONS/SUGGESTIONS

In the Summer Village of Jarvis Bay, most of the aspen and balsam poplar are mature and a small amount of the forest is overmature. If a forest fire or harvesting activities do not occur to encourage the regeneration of the forest, within the next 10 to 30 years the older forest will eventually break up and die due to age related mortality, insect infestations, and fungi diseases. In the future and in harvested areas, aspen and white spruce regeneration must be established and if not, a shrub dominated plant community will likely occupy the area for several decades before trees re-establish themselves.

### Tree Removal/Harvesting

As identified earlier in the report some tree removal may be considered. This work will encourage new regrowth. Small clear-cuts or selective cuts of a few trees would introduce younger trees that will diversify the age and species of the forest while improving the wildlife habitat.

You may consider the following actions:

- Performed tree risk hazard assessment. Hire an experienced professional and qualified tree hazard risk Arborist to identify/evaluate trees for removal that pose tree hazard to people, property and infrastructure
- Consider removing a few aspen trees that are infested by aspen trunk conk to stimulate root suckering
- Avoid tree topping and encourage proper tree pruning on private properties
- Reduce the amount DWM, branches, trees and logs, laying on the forest floor to reduce forest fire fuel.
- Avoid harvest during rain or wet periods so as to not damage soils



Picture 5: Remove all dead and decadent trees ( L ); consider coniferous underplanting ( C ); consider small tree and shrub planting under the powerline ( R )

## Forest Regeneration

Natural regeneration is usually the lowest cost method of forest renewal. The naturally regenerated forest will originate from natural seeding or root suckers. Hardwood species like aspen or balsam poplar produce seeds every year but most reproduction occurs from roots (root suckering) and stump suckers. As aspen and balsam poplar are the most abundant species, natural regeneration through root suckering is the most effective regeneration. After trees are harvested the roots will need full sun light to stimulate suckering. The young seedlings need full light to stimulate roots to produce suckers.

### **Forest Regeneration Recommendation/Suggestions:**

- Consider understory tree planting of native coniferous trees including white spruce, balsam fir, tamarack, lodgepole pine and Douglas fir.
- Plant a variety of native trees and shrub species in open areas.
- During times of high white spruce seed production, consider disturbing soil area to allow white spruce seed to better establish on soil.
- Leave large spruce trees; they are the seed producer for whole area.
- Develop a tree catalog for the summer village. This catalog will help summer village managers and the general public choose the appropriate trees for the area.
- Consider developing a long term plan for caragana removal throughout the summer village
- Distribute educational information about trees. This may include articles and technical information on trees, pests, tree planting, pruning, etc. for staff and general public
- Increase tree and shrub diversity on public and private properties by planting a variety of flowering trees and native shrubs. More diversity will add more resilience and beauty to the summer village.

## Fire Protection

Fire is a natural process of the forest ecosystem. There are two ways to look at forest fire: it is destructive in nature but on the other hand it provides beneficial effects. As a destructive force, a fire will damage buildings, homes, soil, timber, wildlife, watershed, aesthetic, and recreation resources. At times, these features become part of the fuel and contribute directly and indirectly to the difficulty and cost of controlling the event.

The beneficial role of forest fires includes creating seedbeds, opening cones to release seeds, recycling nutrients locked in the vegetation, controlling insects and diseases, reducing competition to seedlings from heavy grass and shrub cover, and to rejuvenate wildlife habitats.

Wildfires can result from both natural and human causes. Generally speaking, there are two types of forest wildfires; crown fires and surface/ground fires. Crown fires move and burn tree canopy moving from one tree top to next. Surface/ground fires burn materials laying on the ground or just above ground. The most common material laying on ground are dead logs, stumps, dead tree limb, grasses and forbs. Ground fires moves at a slower pace than crown fires and are easier to fight. Slope is another important factor to consider as fires moving up a slope move faster than in flat areas.

The most likely human cause is mismanagement and accidents of fire from using various equipment (such as chainsaw, vehicles, quads, welding) and from firepits. Forest fuel (dead logs, branches, twigs, needles) found on the ground during this tree assessment pose low risk for forest fire. However, there are a few dead trees laying on the ground that need to be removed to reduce potential of fire spreading or ignition.

The Jarvis Bay Forest area would be classified according to Canadian Forest Fire Behavior Prediction System (CFFBP)- Fuel Types Descriptions – **as D1 – Leafless Aspen fuel type**. Constant monitoring, education and awareness is very important to reduce the risk of forest fires.

From a natural cause standpoint (e.g. lightning), this forest could be considered relatively low risk even though there is some amount of older, dead and decadent aspen/balsam poplar trees. There is a certain amount of dead wood material (DWM) on the forest floor that has to be considered as fuel load. This DWM is primarily aspen/balsam poplar so there is a relatively low risk of ground fires. However, higher amounts of DWM can lead to higher chances of ground fire with increased intensity and severity of fire. Cleaning up the DWM will reduce the risk of ground fires.

The dead balsam poplar/aspen standing trees as well as logs left on property need to be removed to reduce potential risks of forest fire. There are significant amount of standing dead trees as well as DWM on vacant lots that pose medium ground fire risk. White spruce on private residential land are most likely to spread a crown wildfire throughout summer village. Of course, the highest probability for forest fire comes potentially from residents using fire pits during the fire season.

### Fire management recommendation/Suggestions:

- Reducing DWM fuel loads by selectively removing dead and fallen wood.
- Consider removal of DWM on vacant lots
- Cut grass along perimeters of the summer village
- Remove tall trees under or around powerlines and replace with small tree or shrubby vegetation
- Monitor all activities on the environmental reserve. Activities that utilize machinery always have the potential to provide an ignition source for a fire.
- Restrict activity such as tree cutting during period of high or extreme fire danger.
- Provide brochures and other educational materials related to forest fires. Educational material such as FireSmart for Homeowners <sup>3</sup>



Picture 6: Removal of dead logs from forest floor would reduce risk of forest fires

### **Pest Assessment**

There are thousands of different insects, fungus, virus and bacteria's that are living in the forest that are just part of ecosystem and perform beneficial functions. Insects can act as pollinators, decomposers or as predators of pests. Examples of beneficial insects include ladybugs, ground beetles and parasitoid wasps.

There are a handful of insects and diseases that are consider pests and can endanger the overall health and vigor of the forest. Pests have the largest negative impact when a forest is in imbalance and trees are in a weakened state. Some insects can be destructive and are considered pests. Some pests cause only minor physical damage, while others limit growth or kill trees.

The most common insect defoliators that may occur in the Summer Village of Jarvis Bay forest are: Forest tent caterpillars, Bruce spanworm, Large Aspen Tortix, leaf beetles, yellow headed spruce sawfly and spruce budworm. The most common wood boring insect in Summer Village of Jarvis Bay area is poplar borer. The most common disease that has been found in the forest area are: Aspen conk and Hypoxylon canker.

### **Aspen Trunk Rot (*Phellinus tremulae*)**

This fungus is usually visible and has a very characteristic hoof-shape with the fruiting bodies on the trunk/stems. The fruiting bodies are very hard with blackish, rough and cracked upper surface. The underside is composed of spore-bearing tubes and is brown, with a grey cast in winter. The infection usually enters the tree through branch stubs. Rot can be developed 2 to 3 meters above and below the point of entry. Using tree cores or sounding the lower trunk with a rubber mallet will identify areas of significant internal decay or hollows.

Typically, this fungus results in trunk breakage. Having multiply conks generally indicates considerable internal decay, which substantially increases the risk of tree failure. Tree removal should be considered if multiple conks are present.



Picture 7: Aspen conk is occupying several overmature aspen trees

### **Pest recommendations/suggestions:**

Overall, all there is very little that can be done to control large insect and disease outbreaks except monitoring and removal of dead and dying trees. Keeping beneficial insects and protecting their habitat is key for long-term pest management. Monitoring and surveillance during growing season will provide Summer Village of Jarvis Bay crucial information on health and vigor of their forest.

- Improve and maintain biological diversity as a pest control strategy. Planting varieties of trees and shrubs will increase beneficial insects into the area.
- Diversify forest age structure, which can increase the number of beneficial insects
- Learn to identify and recognize common pests and their activities in your area.
- Do not panic in the case of large defoliation as most of aspen/balsam poplar will leaf out once insect goes into cocoon stage.
- Monitoring is key for pest management. Routinely monitor the incidence of insects and diseases in the forest as well as on adjacent forested land.
- Keep written records of insects and disease and their outbreaks.
- Ask for advice and guidance from qualified pest control practitioners.

## Caragana

Caragana is a non-native shrub species and was observed throughout the Summer Village. It is very aggressive and very detrimental to the natural forest. It is prolific seed producer and very invasive. It is also very hard to destroy. Physical removal as well as education to landowners are two key recommendations in controlling this species. Removal is expensive and should be the long-term goal.

If a decision is made to remove the Caragana, below are some of the steps to be taken to control these shrubs:

- Machine brushing and mulching of the caragana
  - Stump treatment of herbicide application after individual harvesting.
  - Selectively brushing caragana plants where they have crept into the native trees.
  - Consider new shrub or tree planting with the plan to constantly monitor for resurfacing of new caragana plants
  - Consider spot spraying with selective herbicide applications of caragana anticipated to occur from remaining roots and seeds.
  - Cut some aspen and balsam poplar to encourage root suckering. Aggressive young suckers will try to compete with caragana and sea buckthorn for nutrients, water and light and may reduce their vigor and health.
  - In the area of removal reintroduction of native trees, shrubs and grasses, and wildflowers.
- Caragana removal is a long-term project and together with resident education are key to suppress these shrubs.



Picture 8: Caragana on private property along road allowance



## APPENDIX 1. TREE & SHRUB INFORMATION

### Aspen

Aspen grows in almost every soil type but grows best in well drained, sandy or loamy soils with good moisture regime. It will not tolerate shade, or soils which are saturated for a long period of time. Aspen is very often the pioneer species and is usually the first tree species in an unoccupied area. Aspen also acts as a “**nurse trees**” to softwood trees, mainly white spruce. The older aspen will provide a beneficial shade for these trees, which are tolerant to a shade.

Although, aspen produces tremendous numbers of seeds, it regenerates primarily by producing the new shoots from the root system of the parent tree. The new shoots are called root suckers and this process is called "suckering." Suckering usually occurs after a fire, harvesting and other disturbances. By removing the overstory canopy as much as possible, there is more heat and light available to the forest floor, which will stimulate suckering.

In most cases aspen regenerates by suckering but some still comes from seedlings. Good seed crops are produced every 4 or 5 years and some open-grown clones may produce seeds annually.

### White Spruce

White spruce grows very well on well drained, moist, loam, silty loam and clay soils but it can occur on many different types of soils across Alberta landscape. It grows poorly in sandy soils, in sites with a high water-table. White Spruce can tolerate some flooding during growing season. White spruce doesn't tolerate saline soil type.

Young seedlings will tolerate acid soils up to pH 4.5. On shallow soils the root system grows fairly flat and shallow while on deep soil will form a “heart” like root system. Because of shallow roots, a white spruce is very susceptible to being blown over, especially on thin or wet soils. Areas of blown down spruce can be prime breeding sites for the spruce beetle, which can then spread to mature trees and kill the trees. Blown down trees will also increase fire risk in your property.

White spruce grows best in full sunlight but can tolerate shade. In mixedwood aspen/white spruce forest, a young white spruce tree tolerates shade and grows under the protection of other species canopy until the top of white spruce reaches first branch of aspen. After that, it is time for aspen removal and white spruce will grow faster. In mixedwood coniferous stand, white spruce will often become the dominant tree species as stand ages.

White spruce produces thousands of seeds about every four years but doesn't follow any set cycle. In natural stands, cone production occurs primarily on dominant and co-dominant trees. Seeds will remain viable for only 1-2 years. Seedling establishment is best on mineral soil but rarely on deep organic layers. Seedlings grow best in full sunlight but can tolerate low light and shade. For a successful natural regeneration there must be nearby seed sources because the seed supply is greatest nearer the seed tree.

## Balsam Poplar (Black poplar)

Balsam poplar is an important riparian species, which stabilizes riverbanks and maintains river islands. Balsam poplar flower production begins at about 8 years of age, with a good seed crop produced every year. Most seeds are wind dispersed and fall within 650 feet (200 m) of the parent tree. Vegetative reproduction: Balsam poplar is capable of regenerating from root suckers, stump sprouts; stem sprouts and buried branches. Root suckering is thought to be primarily a means of expansion rather than a means of recovery following clearcutting or fire.

Mechanical logging places balsam poplar at a competitive advantage over spruce by creating microsites for seedling establishment. Cutting mature balsam poplars results in sprouting from callus tissue and dormant buds. Balsam poplar is considered one of the tree species best adapted to fire in the northern boreal forest. Its ability to produce sprouts from roots, stumps and buried branches enables it to quickly recover after fire.

Moose commonly browses balsam poplar. Snowshoe hares utilize balsam poplar in times of food shortage. Snowshoe hares ignore first year growth of juvenile balsam poplars but ring the bark of mature trees and eat the twigs when within reach.

## Plants as Indicators of Site Qualities

When the preferred habitat of some of these plants is considered, and how extensively they occupy a site, they can give indications of growing site qualities. These qualities are generally the amount of moisture and nutrients that are available for plant growth. They can also be used as an indicator of qualities such as soil temperatures, water permeability of soils, soil alkalinity or acidity and recent ground disturbances.

When extensive coverage of these plants occurs, this is an indication of uniform qualities of moisture and or nutrients suitable for that particular plant. Plants that are good site quality indicators include dogwood, hazelnut, river alder, marsh reed grass, Labrador tea and bishop's cap.

- **Dogwood** - imperfectly to poorly drained, medium nutrient sites, tolerates fluctuating water table
- **Hazelnut** - well drained, calcium and nitrogen rich soils
- **River alder** - indicates imperfectly to poorly drained soils where spring flooding occurs, tolerates a variety of soil types, nitrogen fixer
- **Marsh reed grass** - prefers moist to wet, fine textured soils with pH between 5 and 5.9, medium nutrient regime, indicates good spruce growing sites if not too wet, may compete with young tree seedlings.
- **Labrador tea** - indicates moist to wet moisture regimes on acidic nutrient poor soils, inhibits growth of some other plant species
- **Bishop's cap** - prefers medium to rich soils with fresh to moist moisture regimes

Most of these (except Labrador tea ) and other plant species commonly found throughout the Ross Heaven indicate average to above average growing site qualities.

## **Biodiversity**

Biodiversity is the measure of the number of species within an area, the genetic variations within those species, and the degree of interactions that occur between them. The degree of biodiversity in an area largely depends on the opportunity presented by the vegetation growing there. Diverse plant age structures and high numbers of different plant species will encourage more animal species to use the area. Wildlife abundance and use of an area are good indicators of a healthy forest ecosystem. They are a significant part of a forest lifecycle that involves water, soils, plant-life, insects, birds and other animals of all sizes. Biodiversity conservation of native species is increasingly being viewed as being an integral component of successfully applying the sustainable land management concept.

Biodiversity includes several components:

- Genetic diversity –variety of genes within a given species
- Species diversity –variety of species within an ecosystem
- Landscape diversity-variety of ecosystems within a landscape

The conservation of all of these types of diversity needs to be considered in the area. Species diversity includes a variety of plants, birds, mammals and other components of forest ecosystems such as insects, fungi, bacteria and etc. Forest biodiversity changes through time. Areas with even aged plant structures and low numbers of different plant species will be used by fewer animal species. Old growth mixedwood forest has the highest number of different species. Riparian wetland areas also have a high number of different species

## **Forest Succession**

Forest succession is the process that forest plant communities go through when changing from one plant community into another. This can happen gradually, as with stand breakup, or quickly from disturbances such as fire, flood or harvest activities. Succession can begin with bare ground, after a fire, logging or other such event. Pioneer plants such as herbs, grasses or moss are often the first plants to grow. These often have a short life span, and return nutrients and organic matter to the soil when they die. Plants such as willows, alders, hazelnut and water birch may appear next. This intermediate stage is the shrub stage.

Pioneer tree species are usually next to become established. These species are fast growing, shade intolerant trees like aspen, birch and jack and lodgepole pine, which may grow from seed or from root or stem suckers. Pioneer trees dominate the stand for the next few decades, as the trees grow, mature and reach old age. Because these trees are shade intolerant, very few seedlings grow in the understory. However, young shade tolerant trees, like white spruce and balsam fir, may be found.

As the pioneer trees grow old and begin to die, the shade tolerant trees start to take over the stand. With few seedlings, the numbers of pioneer trees drop and the stand becomes dominated by the shade tolerant species. Eventually, a single or group of species becomes established, forming a climax forest. Although individual trees in the climax forest die, seedlings developing in the understory replace them.

## APPENDIX 2. RESOURCES

- [Stepping Back from Water Guide](#)
- [Values of Urban forest- Tree Canada Foundation](#)
- [Tree insect and Disease for agroforestry](#)
- [Trees, insects and diseases of Canada's forests](#)
- [How to Plant Tree – Arbor Day](#)
- [Mulching Trees and Shrubs – Yard Whispers](#)

### Woodlot Management Guide for Alberta

[https://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/apa15536/\\$file/woodlot-book%20rd.pdf?OpenElement](https://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/apa15536/$file/woodlot-book%20rd.pdf?OpenElement)

### University of Lethbridge Spatial Data Library

<https://digitallibrary.uleth.ca/digital/collection/geo/id/496/rec/8>

### The system of soil classification for Alberta. On-line Soil Viewer

<https://soil.agric.gov.ab.ca/agrasidviewer/>

### Soils of Canada

<https://soilsofcanada.ca/orders/chernozemic-soils.php>

### Natural Ecoregions of Alberta

<https://open.alberta.ca/dataset/abc81bdb-8b2a-4b81-bb21-61caeda0a029/resource/3a33b989-fca4-45f7-a231-bfd95c6f0166/download/depv1a.pdf>

### Alberta Water Act Legislation

<https://www.alberta.ca/water-legislation-and-guidelines.aspx>

### <sup>1</sup> Stepping Back from Water Guide

<https://open.alberta.ca/dataset/1c70eb43-a211-4e9c-82c3-9ffd07f64932/resource/6e524f7c-0c19-4253-a0f6-62a0e2166b04/download/2012-SteppingBackFromWater-Guide-2012.pdf>

### <sup>2</sup> Alberta Invasive Plant Identification Guide

<https://open.alberta.ca/dataset/8bb61884-bbfb-4640-bd5d-96f6e633d4ee/resource/275f7dbe-8116-4d81-ba95-329df950be7e/download/6740590-2013-alberta-invasive-plant-identification-guide-2013-06-13.pdf>

### <sup>3</sup> FireSmart for Homeowners Manual

[https://firesmartcanada.ca/wp-content/uploads/2019/10/FS\\_Generic-HomeOwnersManual\\_Booklet-November-2018-Web.pdf](https://firesmartcanada.ca/wp-content/uploads/2019/10/FS_Generic-HomeOwnersManual_Booklet-November-2018-Web.pdf)

<sup>4</sup> FireSmart Community Program <https://firesmartcanada.ca/programs-and-education/community-recognition-program/become-a-firesmart-community/>

## APPENDIX 3. REFERENCES

**Beckingham, J.D. Nielsen D.G. and Futoransky V.A.** 1996. Field guide to ecosites of the mid-boreal ecoregion of Alberta. *Canadian Forest Service - Northern Forestry Center, Edmonton*

**Jim Schieck and Marie Nietfeld.** Bird species richness and abundance in relation to stand age and structure in aspen mixedwood forest in Alberta. Chapter 7 in **Stelfox, J. B** (editor) 1995. Relationship between stand age, stand structure, and biodiversity in aspen mixedwood forest in Alberta. Jointly published by Alberta Center (AECV95-R1), Vegreville, AB, and Canadian Forest Service (Project No. 001 A), Edmonton, AB, pp. 308

**Laurance, D. R. Stelfox, J. B, and Nolan J. W. 1995.** Relationship between mammal biodiversity and stand age and structure in aspen mixedwood forest in Alberta. Chapter 8 in **Stelfox, J. B** (editor) 1995. Relationship between stand age, stand structure, and biodiversity in aspen mixedwood forest in Alberta. Jointly published by Alberta Center (AECV95-R1), Vegreville, AB, and Canadian Forest Service (Project No. 001 A), Edmonton, AB, pp. 308

**Peterson, E. B and Peterson, N.M** 1992. Ecology, management and use of aspen and balsam poplar in the prairie provinces. Special Report 1, Forestry Canada, Edmonton AB

**Stelfox, J. B, Laurance, D. R. and Nolan J. W.** 1995. Abundance of ungulates in relation to stand age and structure in aspen mixedwood forest in Alberta. Chapter 9 in **Stelfox, J. B** (editor) 1995. Relationship between stand age, stand structure, and biodiversity in aspen mixedwood forest in Alberta. Jointly published by Alberta Center (AECV95-R1), Vegreville, AB, and Canadian Forest Service (Project No. 001 A), Edmonton, AB, pp. 308

## APPENDIX 4. GLOSSARY OF TERMS

**Access** - Means of gaining entry to a tract of timber/forest

**Age** - Age of the trees comprising a forest, crop, or stand. In forests, the mean age of dominant (and sometimes co-dominant) trees is taken. The plantation age is generally taken from the year the plantation was begun, without adding the age of the nursery stock.

**Age Class** - A distinct group of trees or portion of growing stock recognized on the basis of age.

**Biodiversity (biological diversity)** - Refers to the variety of life on three different levels: the variety of ecosystems (ecosystem diversity), the variety of species (species diversity) and the variety within species (genetic diversity).

**Canopy** - The more-or-less continuous cover of branches and foliage formed by the crown of adjacent trees.

**Clearcutting** - A forest management method that involves the complete felling and removal of a stand of trees. Clearcutting may be done in blocks, strips or patches.

**Decadent** - a silviculturist term for older trees that are on the verge of dying. Decadent trees are often riddled with deadwood, fungal infections and other structural deficiencies.

**Defoliation** - The loss of leaves or needles on a plant or tree.

**Defoliator** - An insect or other agent that consumes foliage.

**Diameter at Breast Height (DBH)** - The stem diameter of a tree measured at breast height above ground level, or 1.3 m

**Early Forest Succession** - The biotic (or life) community that develops immediately following the removal or destruction of vegetation in an area. For instance, grasses may be the first plants to grow in an area that was burned.

**Even-aged Forest** - A forest stand or type in which relatively small age differences (10-20 years) exist between individual trees.

**Forbs** - Broad-leaved, non-woody plants that die back to ground level after each growing season (perennial). Ferns and fern allies are considered forbs.

**Forest Management Plan (FMP)** - A plan prepared for a forest management unit that describes how the timber or other resources will be managed.

**Forest Type** - A group of forest areas or stands whose similar composition (i.e., species, age, height and density) differentiates it from other such groups.

**Fragmentation** - The splitting or isolating of patches of similar habitat, typically forest or prairie plant communities, but including other types of habitat. Habitat can be fragmented naturally or from land management activities, such as clear-cut logging or cultivation

**Ground Cover** - A ground cover is any low-growing plant that shades an area in the landscape

**Habitat** - The area that provides an organism with adequate food, water, shelter, and living space, and/or the conditions of that environment including the soil, vegetation, water, and food.

**Hardwood(s)** - Trees that lose their leaves in autumn, also refers to the wood produced by these trees. Hardwoods belong to the botanical group angiospermae and are the dominant type of tree in deciduous forests.

**Mature/overmature Stands** - Stands that have reached rotation age or have a reduced growth rate due to advanced age. Such stands normally have large mature or overmature trees, an abundance of large live trees with heart rot, numerous snags, stubs and high stumps and an abundance of large downed woody debris.

**Natural Regeneration** - Renewal of a tree crop by natural seeding, sprouting, suckering or layering.

**Old Growth** - A forest of mature or overmature timber that is beyond its peak growing period.

**Overmature** - Trees or stands past the mature stage, where growth rates or value are declining.

**Pest** - An organism capable of causing material damage. Forest pests include insects, tree diseases and noxious fungi.

**Reforestation** - The reestablishment of trees on denuded forestland by natural or artificial means, such as planting and seeding.

**Regeneration** - The continuous renewal of forests. Natural regeneration occurs gradually with seeds from adjacent stands or with seeds brought in by wind, birds or animals. Artificial regeneration involves direct seeding or planting.

**Selective Cutting** - Annual or periodic cutting of trees in a stand in which the trees vary markedly in age. The objective is to recover the yield and maintain an uneven-aged stand structure, while creating the conditions necessary for tree growth and seedling establishment

**Silvicultural Systems** - Systems that follow accepted silvicultural principles, whereby the tree crops are tended, harvested and replaced to produce a crop of a desired form. This includes even-aged (i.e., clearcutting, shelterwood or seed tree cutting) or uneven-aged (i.e., selection cutting) systems.

**Snag Tree** - A dead standing tree at least 6m in height that may provide roosting or cavity nesting/denning opportunities for wildlife

**Stand** - A community of trees sufficiently uniform in species, age, arrangement or condition so as to be distinguishable as a group in the forest or other growth in the area.

**Stand Density** - A quantitative measurement of a forest stand often expressed as number of stems, volume or basal area per unit area.

**Succession** - The replacement of one plant community by another in progressive development toward climax vegetation.

**Sucker** - A sprout from the lower portion of a stem, especially from the root.

**Understory** - The trees and other vegetative species growing under the canopies of larger adjacent trees and other woody growth.

**Uneven-aged** - The term uneven-aged is used to describe stand of trees in which ages of the trees generally differ by more than 20 years. These forest stands are made up of tree species which have evolved a regeneration pattern which is tolerant of lower light conditions and competition from other species.

**Watershed** - An area of land that is drained by underground or surface streams into another stream or waterway.

**Wildlife Habitat Diversity** - The distribution and abundance of different plant and animal communities and species within a specific area.

**Xeric moisture regime** - A xeric habitat is characterized by soils that are well to rapidly drained and low or deficient in moisture that is available for the support