

MOUNTAIN FOREST SECTION RENEWAL COMPANY LTD



STANDARD OPERATING PROCEDURE

SILVICULTURE

2019

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Table 1: Regeneration Standards

STANDARD OPERATING PROCEDURES

1.0 General Overview

Mountain Forest Section Renewal Company (MFSRC) is committed to forest renewal and to ensuring logical development of the forest resource to accommodate all forest values.

The forest management responsibilities apply to areas harvested by Louisiana Pacific (LP) and all third party Quota Holders operating within the Mountain Forest Section (FMU 10, 11, 12, 13, 14) containing softwood volume of 25% or greater. This commitment will ensure the maintenance of forest ecosystems and a perpetual sustained timber supply/yield from the forest landbase.

1.1 Sustainable Forest Management (SFM)

In 1993, the Canadian Council of Forest Ministers (CCFM) began a process to define, measure and report on the forest values Canadians want to sustain and enhance. The CCFM, along with technical and scientific advisors to lend support, consulted a variety of interest groups which resulted in a document called *Defining Sustainable Forest Management: A Canadian Approach to Criteria and indicators* (1995). The development of the document was an important step in meeting Canada's domestic commitments on sustainable forest management.

The purpose of the criteria and indicators (C & I) are to provide a common understanding and scientific definition of sustainable forest management in Canada. Together they form a framework for describing and measuring the state of our forests, forest management practices, values and progress towards sustainability. This information will then be used to develop forest management policy and to determine areas where research is required to fill information gaps and develop new technologies. The C & I approach not only recognizes that forests are ecosystems but also realized forests provide the necessity of public education and participation in the process of sustainable forest management (SFM).

The six criteria relating to sustainable forest management are:

1. Conservation of biological diversity.
2. Maintenance and enhancement of forest ecosystem conditions and productivity.
3. Conservation of soil and water resources.
4. Forest ecosystem contributions to global ecological cycles.
5. Multiple benefits of forest to society.
6. Accepting society's responsibility for sustainable development.

MFSRC is striving toward SFM, as defined by the above criterion, in its forest management practices. These SOP's are a partial fulfillment of SFM. MFSRC works with Louisiana Pacific Ltd, Swan Valley Forest Resources Division (LP) and Mountain Quota Holders Association (MQHA) using the information from Pre-harvest surveys, permanent sample plots, ecological monitoring, research programs to provide data and site-specific ecological information to enable MFSRC to better plan renewal.

1.2 Objectives of the Specifications & SOP

Using LP and MQHA SOP's provides a framework for MFSRC to achieve and maintain a particular standard, as set out in this document as well in the LP and MQHA Plans.

- The government's objectives will be met by the forest management planning process described in the SOP's.
- Provide direction to MFSRC for planning, implementing and monitoring timber harvest operations on the Mountain Forest Section.
- The SOP applies sound judgment based on practical experience and technical competence.
- The SOP's provide documentation, structure and accountability associated with a particular activity.

2.0 Silviculture Practices

MFSRC is committed to implementing forest renewal and stand management practices in all stands harvested in the Mountain Forest Section subsequent to the date of the signing of the Memorandum of Agreement with LP and the Province of Manitoba.

All silviculture practices whether site preparation, tree planting, forest renewal, stand establishment, seed collection, monitoring, stand tending and forest protection will meet or exceed application industry and provincial guidelines. All forest renewal activities will be identified with the LP and MQHA Operating Plans (OP).

MFSRC has been assigned all obligations and responsibilities with respect to forest renewal of softwoods within the Mountain Forest Section. The reforestation activities are financed through the Forest Renewal Charge funded by all merchantable softwood harvested in the Mountain Forest Section.

MFSRC's forest renewal strategy is to reforest harvested ecosystems to their original tree species composition. This objective can be achieved at the landscape level, through silvicultural systems and treatments, which balance the ecology of the forest and the silvics of the tree species.

2.1 Regeneration Strategies and Tactics

All silvicultural management interpretations and prescriptions are based on the field data from the Pre-Harvest Survey, vegetation types (V-types) and soil types (S-types) identified within the Forest Ecosystem Classification for Manitoba Field Guide. All renewal management prescriptions are based on the assessment of the forest ecosystem. This management philosophy encompasses all prescriptions for each ecosystem classification type (treatment unit): the silviculture system, site limitations, harvesting constraints, regeneration method, regeneration species, and to the future monitoring of the treatments.

MFSRC's goal is to implement a variety of silvicultural systems, including natural, assisted, and advanced regeneration processes. To date, acceptable natural regeneration stocking within Jack Pine and Black Spruce ecosystems is being achieved with the clear-cut silvicultural system. In order to achieve natural regeneration within the Black Spruce and/or Jack Pine V-types it is crucial that cone bearing slash be maintained/left within the cutover, usually at the stump. Natural regeneration of the white spruce component of the mixedwood ecosystems will be accomplished by protection of white spruce conifer understorey and the retention of seed trees, which is commonly, incorporated within wildlife leave patches.

Generally, harvested areas will be regenerated natural, advanced, or assisted regeneration efforts, through a variety of silvicultural systems and treatments. For discussion purposes the forest ecosystems harvested within the Mountain Forest Section have been placed into one of the following v-type categories:

- Hardwood Dominant
- Jack Pine Dominant
- Mixedwood Dominant
- White Spruce Dominant
- Black Spruce Dominant

2.1.1 Hardwood Dominant V-Types

A significant portion of what LP harvests are pure hardwood or hardwood mixedwood stands. A 'typical' harvest area is predominantly Aspen, containing some Balsam Poplar, White Birch, and a few residual White Spruce. Occasionally, softwood is removed, MFSRC may plant concentrated softwood sections of these v-types.

Modified clear cutting is utilized within the hardwood v-type. Aspen, poplar and birch are aggressive pioneer species with the ability to regenerate by 'suckering' from the roots or coppice growth from the root collar. Removing the overstorey tree canopy creates hormonal changes and increases soil temperature that stimulates suckering. Hardwood will regenerate within the same year after logging, and establish a dense, vigorous hardwood stand. Only a few hardwood dominant v-types have a volume of softwood of 20% or more. Natural regeneration, suckering, of hardwood is expected in these v-types, so the softwood component is maintained on a small portion of the site. This will lessen the impact on the softwood, and less stand tending would be required.

The immature white spruce occupying the understorey of these hardwood v-types are protected, this also helps with the softwood renewal of the hardwood v-types that are planted. LP's Standard Operating Guidelines titled 'Protection and Preservation of Advanced White Spruce Regeneration' demonstrates how this works.

2.1.2 Jack Pine Dominant V-Types

Modified clear cutting is the silviculture system used for Jack Pine v-types. Jack Pine is an early successional, pioneer species, when exposed to direct sunlight will germinate and grow. After clear cutting, Jack Pine germination and establishment occurs from natural seeding. Opening the canopy will open the serotinous pine cones. When the cones open, seeds are deposited onto the mineral soil and germinate. Jack Pine trees are delimited at the stump after felling; this leaves the branches, cones and seeds on the site. Delimiting at the stump ensures that adequate cones and seeds are available for natural regeneration. Sites harvested during the winter months will be scarified using shark-fin barrels and anchor chains to create mineral soil exposure that is crucial to the establishment of Jack Pine regeneration. Natural regeneration is easily attained within Jack Pine v-types when they are harvested correctly.

There are some Jack Pine cutovers that may not naturally regenerate to acceptable stocking levels and densities. These sites will be planted to ensure they reach an acceptable stocking standard.

2.1.3 Mixedwood Dominant V-Types

The mixedwood v-types are predominantly composed of aspen, poplar, birch, spruce and Balsam Fir. Mixedwood ecosystems are harvested by modified clear cutting with protection of White Spruce understorey. Excessive coniferous slash reduces the number of plantable microsites; therefore portions of mixedwoods cut blocks will be delimited at roadside and the slash piles burnt.

Mixedwood v-types are challenging because you need to maintain the softwood component as well as the hardwood. Hardwood and conifers grow well together but too many hardwood stunt conifer and decrease the growth rate substantially. This balance of conifer and hardwood makes mixedwood sites the most complex and challenging.

Site preparation is not done in these sites, due to greatly increased competition from grass, weeds, and aspen. Disturbing the soil will promote excessive aspen suckering. Portions of mixedwood v-types are area planted to avoid excess aspen suckering, grass and weeds, yet still establishing a crop of spruce trees 1,400 – 1,800 stems per hectare immediately after harvest. Suckering of the hardwood is expected and encouraged on mixedwood sites where spruce has not been planted.

Planted conifer regeneration success is dependent upon desirable seedling microsites, effectively managing slash loading, planting large high-quality seedlings, planting after harvest, before hardwoods become established, and proper microsite selection.

Areas harvested utilizing understorey protection are identified as ‘leave for natural regeneration’ (LFN) spruce regenerated areas. Typically, the skid trails within the protected white spruce understorey areas are directly planted.

2.1.4 White Spruce Dominant V-Types

White Spruce Dominant v-types have excessive slash loading from spruce limbs, which reduces the number of available microsites for reforestation. Logging the site whole tree alleviates this. The trees are delimited at roadside and the limbs are piled and burned.

Historically, white spruce has been grown as an early successional species. This is done by clear cutting, site preparation, then planting and tending to remove all other tree and shrub species. The silvicultural systems used in this v-type will be natural regeneration, assisted and advanced regeneration strategies.

A variety of silvicultural systems are prescribed within the white spruce dominant v-types. Natural regeneration will be used when a single/group seed tree, understory protection, selection or shelterwood silvicultural systems may be prescribed.

Areas that have been clear-cut will be scheduled for direct planting, 1,800 to 2,000 stems per hectare, immediately following harvest.

2.1.5 Black Spruce Dominant V-Types

Black Spruce grows on wet organic, wet mineral, and upland mineral soils. Black Spruce most commonly grows as pure stands on organic soils, and it occurs as mixed conifer stands with Jack Pine or mixedwood stands on mineral soils. These v-types are clear-cut then planted and/or left for natural. Lowland Black Spruce will be left for natural or site prepared and/or area planted with Black Spruce.

Upland Black Spruce sites are scarified and/or planted immediately after harvest. The Black Spruce planted will be medium to large stock.

The Black Spruce/Jack Pine v-type will be scarified with barrels and chains then planted with Black Spruce and Jack Pine seedlings. The density of planted spruce and pine will range from 1,800 to 2,200 seedlings per hectare. Scarification will promote natural regeneration of spruce and pine and create a favorable planting microsite for spruce and pine seedlings.

2.2 White Spruce Understorey Protection

Clear cutting is the dominant harvest system prescribed; MFSRC will identify areas where alternative silvicultural systems make better ecological and economical sense. An example is the hardwood and hardwood-dominated mixedwood stands where advanced white spruce regeneration is in the understorey. A modification to the clear-cut harvest system has allowed MFSRC to protect the existing white spruce understorey refer to LP's Standard Operating Guideline titled 'Protection and Preservation of Advanced White Spruce Regeneration'.

3.0 Seed Inventories

MFRSC will maintain enough seed inventory to ensure that there are an adequate number of coniferous seedlings to plant into harvested areas. Ideally, a minimum of ten years of seed for each conifer species is kept. All seed is locally collected within the proper seed zone, and is stored at Pineland Forest Nursery located in Hadashville, MB.

MFSRC will maintain the seed inventory numbers. MFSRC will collect the seed for Jack Pine, Black and White Spruce. This will be done, when required, during high yielding years.

3.1 Seedling Requirements

MFSRC will annually plant high quality coniferous seedling/stock of 1.4 to 2.0 million seedlings annually in the Mountain Forest Section.

Seedling orders will be comprised of White Spruce, Black Spruce and Jack Pine. Over-wintered container stock will be used due to access limitations within many of the harvested areas in the Mountain Forest Section. A large number of seedlings will be snow cached every year, usually mid February to mid March, because of access limitations.

4.0 Scarification & Site Preparation

Mechanical site preparation methods will be used on selective sites to encourage natural or assisted regeneration of harvested areas. This will create suitable microsites for planting. MFSRC's silviculture forester will determine the site preparation equipment best suited for the site using the pre-harvest survey as well as a post harvest assessment. This information will be included in the forest renewal section of the LP and MQHA OP.

MFSRC's philosophy towards site preparation is "less is best". The intensity of the treatment is site-specific to each forest ecosystem. Site preparation prescriptions are developed after reviewing the pre-harvest survey data. All areas identified for treatment will be inspected during or immediately after harvesting. Supervision of the site preparation equipment is continuously performed during active treatment to ensure that the desired results are achieved.

To determine the desirable number of microsites per hectare to be created within an area the appropriate provincial stocking standards, stand management objective and pre-harvest V-Type must be considered. The acceptable seeding/planting microsites to be created must be clearly defined before site preparation can begin. Based on current forest renewal standards, MFSRC will have the following microsites per hectare targets for coniferous tree species (Jack Pine, Black and White Spruce):

- Softwood Sites - 1,800 to 2,200 microsites per hectare; and
- Mixedwood Sites - 1,400 to 1,800 microsites per hectare.

Seedling mortality and natural regeneration must be considered when determining the actual number of microsites to be created on a specific site.

Scarification/Site Preparation is not required on the pure/dominant hardwood and mixedwood vegetation types. These sites aggressively regenerate by suckering after harvesting. The clear-cut silvicultural system promotes sufficient regeneration on these sites.

Scarification is used for the pure and dominant Jack Pine and Black Spruce v-types. Barrels and chains are used to expose mineral soil to create germination microsites, and to distribute cones to promote natural regeneration and assist tree planting. This has effectively achieved disturbance to the organic soil layer promoting Jack Pine and Black Spruce regeneration.

Field assessments of quality and spacing (number of microsites created per hectare) are performed during or after each treatment. A 50 m² circular plot per hectare sample size is used to assess the treatment. Planting spots are tallied as to acceptability and quality. The acceptable planting spots are totaled within the plot and multiplied by a factor of 200. This is to determine the total number of microsites per hectare. This will ensure there are an adequate number of planting spots achieved and maintained. The assessment ensures that favorable microsites (quality and quantity) for seed/seedlings are being created/achieved and detrimental site disturbances (excessive soil displacement) are not occurring.

5.0 Snow Cache

Snow caching is a method of storing seedlings in harvested areas that are restricted to winter access only. Frozen conditions in February and March allow seedlings to be transported to the site by truck and trailer, rather than by ATV, track vehicle, or helicopter in the spring. This restriction makes snow caching of seedlings an inexpensive way of storing seedlings in the field aiding in renewal expenses. Seedlings have been snow cached successfully in Manitoba over the past several decades. The advantages of snow caching is reduced excessive handling stress on seedlings, reduced seedling transport and tree plant costs, and minimized damage/disturbance to access roads and water-crossings.

6.0 Tree Plant

The majority of the seedlings will be planted in the spring from mid-May to the end of June. The start up date will be dependent upon spring weather conditions and the surface soil thawing. When temperatures become warm and the risk of frost is low, spring planting will commence.

To allow seedlings to maximize their growth potential and minimize the risk of loss to frost damage and drought, the right planting window and dates must be considered carefully. Over-wintered seedlings are planted in the spring. They will flush and initiate shoot and root growth soon after planting. For this reason, spring planting must be completed by the end of June. This allows the seedlings adequate time to grow, set bud and harden-off prior to the fall frosts, which usually occurs by early to mid- September. Seedlings that do not have adequate time to harden-off will suffer from frost damage, a reduction in potential growth rate and survival rate.

7.0 Assessments and Surveys

MFSRC will assess all the blocks that have been treated and planted in the Mountain Forest Section. Plantation assessments will be conducted to ensure the seedlings have survived. Regeneration surveys will be performed in five to seven years to ensure the harvested area has reached the appropriate regeneration standard. In ten to twenty years, the harvested area receives a Free to Grow survey to ensure the harvested areas have achieved its original covertime.

7.1 Plantation Survival Assessments Surveys

MFSRC will be conducting plantation assessments within the Mountain Forest Section. Plantation assessments established measures seedling survival, seedling vigour, and competition. The objective of this survey is to measure the success of the plantation with respect to seedling survival and vigour; the density of planted and natural occurring seedlings; and provide data for future prescriptions and silvicultural treatments. This assessment provides information on harvested areas that have been planted that may require refill planting.

7.2 Forest Regeneration Surveys

MFSRC will be performing forest regeneration surveys on mixedwood and softwood areas that have been treated by site preparation, scarification, and/or planting. Provincial forest regeneration survey methodology and standards will be used. The information collected from these surveys provides stocking, density, and measurements of tree species; potential problems that may require additional treatment; and measure success of forest regeneration. The surveyors performing the surveys are certified and follow the procedures within the Manitoba Forest Regeneration Survey Manual (SD, 2018).

This survey will measure the regeneration success of the softwood and mixedwood sites in the Mountain Forest Section. The data collected from the surveys can also provide status of the harvest areas and analysis of specific treatment responses.

7.3 Free to Grow Surveys

The Province of Manitoba has developed Free to Grow (FTG) standards for Jack Pine and Black and White Spruce. This standard quantifies whether a harvested site is not free growing or free growing and determines an appropriate forest cover class classification. The FTG survey is designed for application 10 years after harvest on softwood and mixedwood harvested sites. The first plantation was on a 1996 harvested site; FTG surveys were underway in 2011.

Licensed surveyors following the Manitoba Free to Grow Survey Procedures Manual are performing these surveys.

A FTG survey is being developed that is a mix of the regeneration and FTG survey; the Forest Renewal Assessment Survey. It measures the stocking, stems per hectare and height of the trees. Trees over a certain height are considered performing.

Provincial Forest Regeneration Standards

Harvested areas receive a certificate when they have reached a species mixture approximate to the original forest type before harvest. The area might be satisfactorily regenerated (SR), but with the wrong original cover type, a certificate will not be awarded. Since the area is SR and it satisfies any of the other forest renewal standards, no more treatment is required.

These standards are located in the ‘Development of Forest Renewal Standards for Forest Regeneration in Manitoba’ through Manitoba Conservation. Table 1 shows examples of the regeneration acceptable and certification standards.

Table 1: Regeneration Standards

Former Stand Cover Type	Regeneration Standards for Certification	Acceptable Regeneration Standards
Softwood “S”	Softwood “S” Mixedwood “M”	Mixedwood “N” Hardwood “H”
Mixedwood “M”	Softwood “S” Mixedwood “M” Mixedwood “N”	Hardwood “H”
Mixedwood “N”	Mixedwood “M” Mixedwood “N” Hardwood “H”	Softwood “S”
Hardwood “H”	Mixedwood “N” Hardwood “H”	Softwood “S” Mixedwood “M”

The Forest Renewal Assessment survey result will be either sufficiently performing, sufficiently regenerating or not sufficiently stocked.

8.0 Stand Tending

MFSRC may do some stand tending on successfully regenerated harvested areas to ensure maximum growth potential. Controlling competing vegetation would be done by aerial or manual release using brush saws or applying herbicides. This controlling of vegetation will give the harvested stands the opportunity to become FTG.

9.0 Access Management

MFSRC will use existing access and crossing locations to plant blocks. Temporary bridges will be constructed over stream crossings and wet areas using corduroy and mud mats. The road closure will be maintained and/or restored at the beginning of the main haul road.

References

LP Standard Operating Guidelines – Silviculture, 2006

LP Annual Operating Plan – 2008

MQHA Annual Operating Plan - 2008