New Brunswick Private Woodlot Silviculture Program

2018-19

Department of Energy and Resource Development

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Private Woodlot Silviculture Program

Objective: Private woodlots account for 30% of New Brunswick's forests or 1.9 million hectares and are an integral component of the provincial wood supply and rural economy. To grow a sustainable supply of quality forest products which will be used in processing facilities, provincial government partners with private woodlot owners and Forest Product Marketing Boards to fund certain silviculture treatments. These investments are expected to result in more valuable wood products available for harvest earlier than without such treatment. For more information on the value of the forest industry to New Brunswick, visit www.nbforestry.com.

Administration: The Private Woodlot Silviculture Program is administered by the Forest Operations and Development branch of the Department of Energy and Resource Development (ERD). Participation by woodlot owners is voluntary and the program is available to woodlot owners through one of the seven Forest Products Marketing Boards. Coordination is performed by the New Brunswick Federation of Woodlot Owners (NBFWO), performance monitoring is done by ERD Regional staff and financial oversight is performed by the New Brunswick Forest Products Commission.

Funding: Program funding is determined annually on the basis of a cost-sharing arrangement whereby government contributes a percentage of the total estimated treatment cost. The woodlot owner is expected to contribute the remainder of the total treatment cost. The cost-sharing percentage contributed by government and the resulting rates ($/hectare) paid by ERD for eligible treatments may be adjusted as required.

The total estimated cost ($/hectare) for an eligible silviculture treatment includes the estimated costs to perform the work as well as estimated costs for Marketing Board administration. These administrative costs may include costs for pre-assessments of potential lands, post-treatment measurements, payment processing and on-going evaluation of treated sites. The maximum allowable Marketing Board administration deduction is 20% of the total estimated treatment cost unless otherwise specified.

Table 1 lists the current cost-sharing percentage contributed by government, the treatment activities currently available under the program, and the rates paid for each treatment type (including the Marketing Board administration cost).

Eligibility Requirements

Private Woodlot: As defined in the *Forest Products Act* and not be held by a Crown Timber Licensee, Sub-Licensee or Crown Corporation.

Property Size: Privately owned property, as identified by the PID number, is to be 10 hectares (ha) or larger (see exceptions below).

A property of less than 10 ha may be eligible if;

- it is adjacent to other property owned by the same landowner, and is separated from that other property by a trail, road, railroad, utility corridor or highway, and, in conjunction with the other property, is ≥10 ha, OR;

- it is > 5 ha and where the registered landowner agrees in writing to manage the property in a manner consistent with the time frame necessary to produce primary wood products (see Appendix 13).

Investment Timeframe: There should be reasonable expectation that Woodlot Management Recommendations and treatments carried out under this program will enhance the volume and/or quality of forest products over at least a 10 year timeframe. Where site or stand conditions, incidence of disease or insect damage or landowner objectives suggest this expectation will not be met, such properties are not eligible for treatments under this program.

Sustainable Forestry: Any property which has received treatments under this program and then has been harvested without consideration for capturing the optimal value of forest products, minimizing waste and avoiding damage to other forest resources is not eligible for subsequent treatments under this program. For example; complete harvesting of a healthy 20-year old plantation cannot be followed by a planting treatment under this program.

Work Area Size: For all silviculture treatment activities funded under this program, the minimum size work area is 0.2 ha. Funding claims for total work area less than 0.2 ha will not be accepted. Work blocks of less than 0.2 ha included as part of a larger claim will not be accepted.

Woodlot Management Recommendations are considered a treatment category and are available for eligible properties 5 ha or larger only. To be eligible for funding an entire PID number property area must be included in the management plan (see appendix 8). *In situations where exceptions to these requirements may be warranted, the written approval of the appropriate Marketing Board and ERD is required. Such approval must be documented.*

Limits for Annual Funding: Marketing Boards are responsible for ensuring woodlot owners have fair access to the program and to this end, a Marketing Board may establish limits for annual cost sharing funding to individual woodlot owners.

Publishing of Treatment Locations: Any property which has received treatments under this program may have its location published for the purposes of operating the program.

By participating in the program, landowners authorize and consent to the disclosure and use of the treatment location information for forest inventory, public education or other purposes related to the program.

Personal and financial information collected are subject to the *Right to Information and Protection of Privacy Act*.

ERD Access to Private Woodlots: Any property that has received treatments under this program may be inspected by ERD staff members for compliance with criteria, rules and regulations outlined in this manual. For these purposes, ERD staff members may enter

upon and pass through these private properties without being liable for trespass at any time during or after treatment.

Farmland Identification Program

Participation in the Private Woodlot Silviculture Program with land registered in the Provincial Farm Land Identification Program (FLIP) may affect continued eligibility for property tax deferrals.

Prior to participating in the Private Woodlot Silviculture Program, landowners of FLIP registered property are advised to discuss the implications with their Marketing Board representative, or with the FLIP Registrar at **(506) 453-2252.**

More information on the FLIP program is available at:

http://www2.gnb.ca/content/gnb/en/services/services_renderer.14296.Farm_Land_Identification_Program_.html.

Table 1. Private woodlot silviculture program treatment cost-sharing for 2018-19.

2018-19				
Treatment Type Code	**Site**	**Description**	**Rate Code**	**Rate/ha (ERD contribution)**
Plantation Establishment				***90:10 Cost-Sharing***
FP	farmland	full planting	335	$710
FP	farmland	full planting with site preparation - herbicide aerial	356	$932
FP	farmland	full planting with site preparation - herbicide ground	355	$1,128
FP	farmland	full planting with site preparation - C&H plow	347	$1,172
FP	farmland	full planting with site preparation - disc trencher	345	$1,061
FP	farmland	full planting with site preparation - drags	346	$1,075
BP	forest	full planting (no site preparation) *TRIAL*	50	$837
BP	forest	full planting (previous site preparation)	194	$710
BP	forest	full planting with site preparation - herbicide ground	353	$1,128
BP	forest	full planting with site preparation - herbicide aerial	354	$932
BP	forest	full planting with site preparation - C&H plow	311	$1,172
BP	forest	full planting with site preparation - disc trencher	309	$1,061
BP	forest	full planting with site preparation - drags	310	$1,075
Site Preparation				***90:10 Cost-Sharing***
FS	farmland	site preparation - herbicide aerial	352	$222
FS	farmland	site preparation - herbicide ground	351	$418
FS	farmland	site preparation - C&H plow	342	$462
FS	farmland	site preparation - disc trencher	340	$351
FS	farmland	site preparation - drags	341	$365
BS	forest	site preparation - herbicide aerial	350	$222
BS	forest	site preparation - herbicide ground	349	$418
BS	forest	site preparation - C&H Plow	308	$462
BS	forest	site preparation - disc trencher	306	$351
BS	forest	site preparation - drags	307	$365
Fill Planting				***90:10 Cost-Sharing***
FF	farmland	fill planting	336	$579
BF	forest	fill planting (0-60% stocking)	46	$579
Herbicide Release				***90:10 Cost -Sharing***
FH	farmland	herbicide release aerial	338	$222
FH	farmland	herbicide release ground	337	$418
BH	forest	herbicide release aerial	334	$222
BH	forest	herbicide release ground	333	$418
Thinning				***90:10 Cost-Sharing***
BC	forest	full plantation cleaning	339	$691
BC	forest	full plantation cleaning (high density)	357	$958
BT	forest	pre-commercial thinning	331	$958

Treatment Type Code	Site	Description	Rate Code	Rate/ha (ERD contribution)
Management Planning / Harvest-based				
PM	forest	woodlot management recommendations (per document + $5/ha if > 40 ha to maximum $600)	600	$500
CT	forest	commercial thinning	700	$700
TH	forest	hardwood stand improvement[2]	701	$700
OP	forest	operating plan[2]	702	$400
Forest Measurements				
FM	forest	permanent sampling plot (PSP) re-measurement	601	$1400
FM	forest	PSP establishment (commercial thinning)	602	$2650
FM	forest	PSP establishment (hardwood stand improvement)	603	$2250
FM	forest	PSP establishment (operating plan)	604	$2250

[2]maximum $140/ha for Board Administration

Pre-Treatment Assessment Procedures for Marketing Boards

Criteria: Criteria developed for each silviculture treatment type are summarized in Appendices 1-10.

Note: *Pre-treatment approval must be obtained from ERD for treatment of any sites which do not meet listed criteria*.

Multiple Treatments: Other than herbicide plantation release on forest sites (see Appendix 5), no work area will be funded through this program more than once for any given treatment type.

Signed Landowner Agreement: In order for any work under this program on a private woodlot to qualify for funding, the *Landowner Agreement* (see Appendix 14) must be signed. A signed Landowner Agreement is needed for each treatment on a private woodlot (identified by the PID number). If the private woodlot changes hands and the new owner(s) want to participate in the program, then a new landowner agreement must be signed. A Marketing Board may also have an existing version of a landowner agreement. In that case, the Marketing Board's own landowner agreement will be valid and attached to the signed ERD Landowner Agreement.

Perimeter Marking: To facilitate post-treatment inspection, all work area perimeters should be marked by Marketing Board staff, by tying distinctive colored flagging tape at each corner of the entire perimeter of the work area represented on the post-treatment certification form. When more than one parcel (PID) is included in a work area, property lines should be clearly marked**,** and, the number of hectares treated on each PID clearly noted on the certification submission.

Sampling Procedures: Plot size requirements for pre-treatment assessment and post-treatment inspections are summarized in Appendix 13: Required Plot Sizes for Pre-Treatment Assessment & Post-Treatment Inspections.

Work Certification and Payment Procedures for Marketing Boards

Submission Procedures: Work certification data for all completed program treatments will be submitted digitally by the Marketing Board using the Electronic Silviculture System (E-Silv) Transfer File Structure. By submitting this data, the Marketing Board certifies that the treatment has met the requirements and criteria listed in this manual and any additional site specific ERD requirements.

Submission Timing: Marketing Boards will make best efforts to submit completed treatment data on a regular basis (i.e. within two weeks of post-treatment inspection) The following deadlines for post-treatment certification submission will be applied:

Treatment Type	Deadline for all submissions
Herbicide	1 October
Site Preparation	1 December
Planting	1 October
Pre-commercial Thinning, Plantation Cleaning	1 January
Commercial Thinning, Hardwood Stand Improvement, Operating Plans	31 March
Plantation Performance Reports	1 May

Note: Failure to submit post-treatment certification records to E-Silv by these deadlines may result in payment delay

Program Payment Coordination: The NBFWO will coordinate the following on behalf of the Marketing Boards:

- allocation of program funding among Marketing Boards;
- payment invoicing to ERD;
- monthly reporting on work completed by Marketing Boards and cost-sharing funds distributed to participating woodlot owners; and,
- year-end reporting on administration costs, woodlot owner cost-sharing contributions and program performance measures.

Post-Treatment Performance Monitoring by ERD

Random Auditing: ERD staff will conduct random inspections, by area (ha), across each treatment type to verify compliance with both treatment criteria and site area (ha) treated, as follows:

Treatment Type	Auditing intensity
Planting/ site preparation	≥ 20 %
Herbicide	≥ 20 %
Pre-commercial thinning, plantation cleaning	≥ 10 %
Commercial thinning, hardwood stand improvement, operating plan	≥ 10 %
Plantation Performance Reports	≥ 5 %
Woodlot Management Recommendations	≥ 10 %

Post Treatment Assessment: Once a treatment site is selected for auditing, it will be sampled as outlined for each treatment in the Appendices. ERD staff reserve the right to take high resolution ortho-imagery of the treatment site using UAV systems, if so required for auditing purposes.

Post-Treatment Joint Evaluation: If a ERD inspection finds that a treatment site does not meet criteria, the Marketing Board will have the option of requesting a joint evaluation. Results of joint evaluation will be final. Treatment sites deemed not meeting program criteria will have the total site area rejected and applied to a year-end area reconciliation calculation.

Site Area Difference: If during inspection a difference of more than 5% in a submitted individual site area is found, the Marketing Board will be notified. Marketing Boards will have the option of accepting the ERD area measure, or calling for a joint evaluation, the results of which will be considered accurate**.** If work area boundaries are not evident, the Board will be contacted to identify the boundary.

Year End Area Reconciliation: A year-end financial adjustment will be made if an overall area difference of greater than 3% by treatment type is assessed for an individual Marketing Board. The % difference will be applied to the total area submitted for this treatment type and financial reimbursement to ERD will be required equaling the product of this area difference times the treatment rate paid by ERD.

Plantation Performance Reports & Woodlot Management Recommendations: The ERD inspections of these reports will involve an office review of submitted records as well as a field review of selected treatment sites. Stocking plots may be necessary to verify conformance with the above requirements.
Non-conformance with these requirements may result in the additional requirement for a Marketing Board to submit a compliance action plan for ERD approval detailing the

corrective actions to be taken (both with regard to reporting and treatment) along with a schedule for completion.

Annual Financial Reporting by Marketing Boards

By June 30th of each year, a financial report (Schedule A) shall be submitted by the Forest Products Marketing Boards to the New Brunswick Forest Products Commission. This report must demonstrate that the cost-sharing contributions (monetary and in-kind) to the program by woodlot owners and/or Marketing Boards on behalf of woodlot owners for the previous fiscal year. The Schedule A report will also summarize the program funds allocated towards direct treatment costs and administration costs.
Where possible, the figures in this report will be based on each Board's audited financial statements. The New Brunswick Forest Products Commission reviews the information submitted by the boards for compliance with program requirements and reports the results to ERD. ERD may request the revenue portion of the report to be submitted on or before January 31st of each year.

***Note*:** Failure to submit the Schedule A report in a timely manner may result in reduced program funding.

Rules and Regulations Governing Activities on Private Woodlots

All forest management activities on private woodlots including any treatments carried out under the N.B. Private Woodlot Silviculture Program must comply with all applicable laws including the following:

- The *Clean Water Act*. The Watercourse and Wetland Alteration Regulation (90-80) protects provincial streams, rivers, wetlands, and lakes from work or ground disturbance in their vicinity. This includes (but is not limited to) all treatments funded under the Private Woodlot Silviculture Program. Any person intending to do work within 30 metres of a watercourse must apply for a permit (WAWA Permit) from the Department of Environment and Local Government (ELG).
- The *Forest Products Act* establishes the Forest Products Commission and governs the powers, duties and activities of the Commission including the oversight and general supervision of the Marketing Boards. The underlying objective of both the *Forest Products Act* and the *Natural Products Act* (with respect to farm products of the forest) is the control and regulation of primary forest products coming from private woodlots in New Brunswick.
- The *Forest Fires Act* requires that any work on forest land in which two or more persons are engaged have the required firefighting equipment on site to combat a forest fire. These persons must also establish a prearranged plan of action to deal with any outbreak of fire; and assure that each employee designated in the plan of action is made fully aware of his or her responsibilities in case of fire. A work permit may be required as well depending on the type of forest operation.
- The *Transportation of Primary Forest Products Act* requires that all wood products transported in New Brunswick (including private land) have a

Transportation Certificate indicating source, date and time loaded, product, species, destination, licence plate number, name and signature of vehicle operator, offload date and receiver signature (Section 3 of Regulation 2002-37). Marketing Boards administer the Transportation Certificate system for private woodlots.

- The *Pesticides Control Act*. All pesticides used in New Brunswick are registered by the federal government, and only these pesticides may be used in the province. Pesticide use is further controlled (regulated) under the authority of the provincial *Pesticides Control Act* and Regulations, which is administered by ELG. The aim of the provincial legislation is to ensure that pesticides are used, stored and disposed of so that there is minimum impact on non-target species, human health or the environment.

Any ERD staff member who discovers a violation of one or more of these Acts within, and/or associated to a treatment submitted under the N.B. Private Woodlot Silviculture Program, will report the violation to the appropriate authorities.

Appendices

Appendix 1: Pre-Commercial Thinning

Objective: To reduce the number of trees on a site using a thinning saw, allowing the remaining crop trees to maximize their growth.

Pre-Treatment Assessment

- Density: > 5000 stems/ha with crop trees not in a "free to grow" condition (using 1.46 m radius (6.7 m^2) plots where 1 "in" tree represents 1,500 trees/ha).
- Stocking: > 60% crop tree species (using 1.26 m radius (5 m^2) plots where one "in" tree represents stocked)
- Remnant overstory: < 25% crown closure (8 m^2 residual basal area)
    - Large mature white pine or clumps of remnant overstory should be considered voids
- Average crop tree height: 2.0 - 7.0 m softwood
  4.0 - 9.0 m hardwood
- Locations with average crop tree height 1 meter greater than the maximum may be considered if the following criteria are met:
    - No removal of commercial products
    - Productive sites with low risk of insect, disease and/or weather damage
    - Live crown ratio adequate for growth response
- Acceptable crop tree species: jack pine, spruce, fir, white pine, cedar, hemlock, red pine, larch, sugar maple, red maple, yellow birch, oak, black cherry, basswood, ash, white birch, aspen*, potentially disease resistant beech**, any combination of above. (Layered spruce and advanced stunted fir is not acceptable.)
- * Additional criterion for pre-commercial thinning in aspen ("poplar") stands**:** Trembling Aspen stocking must be less than 50% of the pre-treatment crop tree stocking. Large tooth aspen will be accepted in mixed wood stands on well and moderately-well drained sites only. Crop trees must have good form with no damage or evidence of fungal defects. Areas that are predominately Aspen must be stratified out and not mixed with other tree species to achieve a stocking that is less than 50%.
- ** Additional criterion for pre-commercial thinning in beech stands: potentially disease resistant Beech will be acceptable crop trees when assessed as > 5cm dbh root sprouts showing nil or low scale infesting and smooth bark.

Post-Treatment Inspection

- Stocking: > 60% (using 1.26 m radius (5 m^2) plots where one "in" tree represents stocked); Trembling Aspen < 50% of overall post-treatment crop tree stocking.
- Average crop tree height: within pre-treatment assessment ranges for released crop trees in density plots; no crop trees < 2.0 m.
- Quality: > 85% overall quality compliance using quality deductions as follows:
    - Crop tree selection = 5% per tree
    - Excessive cutting of potential crop trees = 5% per tree
    - Crop tree damage = 3% per tree
    - Crop tree spacing = 3% per tree
    - Uncut competition*****= 3% per tree

- Live branches on cut stumps = 3% per plot
- Incomplete cuts = 1% per plot

- Density** (using 3.57 m radius (40 m^2) plots where 1 “in” tree represents 250 trees/ha):
  - 2,000 - 3,500 crop trees/ha (softwood)
  - 3,000 - 4,000 crop trees/ha (white pine)
  - 2,000 - 3,500 crop trees/ha (hardwood)
  - 2,000 - 3,500 crop trees/ha (mixed wood)***

- Voids: All untreated areas (i.e. large clumps of remnant overstory, bogs, rock outcrops, etc.) larger than 0.04 ha are considered voids and will be deducted to calculate net treated area. All voids 0.5 ha and larger are to be mapped. When measuring a void, a growing space of 1 m is allowed on crop trees.

** Generally the mid-range of stated densities should be aimed for as the ideal. The range is to allow some flexibility for individual situations.

*** Mixed wood is where softwood and hardwood species both comprise >25% of crop trees.

*****Includes all competing tree species such as but not limited to: pin cherry, grey birch, alder, and aspen. The only brush species considered as competition is beaked hazelnut.

Sampling Procedures: Stocking and density plots must share the same plot centre.

- Plot intensity: greater of one plot pair per ha or 4 plot pairs per work area.

Appendix 2: Plantation Cleaning

Objective: To reduce undesirable natural regeneration on a site using a thinning saw, allowing the remaining planted crop trees to maximize their growth.

Pre-Treatment Assessment

- Density: > 5000 stems/ha with crop trees not in a "free to grow" condition (using 1.46 m radius (6.7 m^2) plots where 1 "in" tree represents 1,500 trees/ha).
- Not in "free-to-grow" condition: ingrowth of competition* is significant (more than 40% of crop trees affected) and will continue; plantations greater than 12 years of age with acceptable stocking and competition average height below crop tree height are not eligible
- Stocking: > 60% softwood crop tree species (using 1.26 m radius (5 m^2) plots where one "in" tree represents stocked)
- Average crop tree height: 2.0 - 6.0 m softwood
  4.0 - 9.0 m hardwood
- Acceptable crop tree species: jack pine, spruce, fir, white pine, cedar, hemlock, red pine, larch, sugar maple, red maple, yellow birch, oak, black cherry, basswood, ash, white birch, aspen, beech, any combination of above. (Layered spruce and advanced stunted fir is not acceptable.)
- High-density plantation cleaning: > 20,000 stems/ha; site must be stratified to isolate higher density patches (> 20,000 stems/ha) instead of averaging higher density with lower density to result in a site average over 20,000 stems/ha.-+

Post-Treatment Inspection

- Stocking: > 60% softwood crop tree species (using 1.26 m radius (5 m^2) plots where one "in" tree represents stocked); Trembling Aspen < 30% of overall post-treatment crop tree stocking.
- Free to grow target crop tree density range: 1500 to 2500 stems/ha
- Average crop tree height: within pre-treatment assessment ranges for released crop trees in density plots; no crop trees < 2.0 m.
- Quality: > 85% overall quality compliance using quality deductions as follows:
  - Crop tree selection = 5% per tree
  - Excessive cutting of potential crop trees = 5% per tree
  - Crop tree damage = 3% per tree
  - Crop tree spacing = 3% per tree
  - Uncut competition*= 3% per tree
  - Live branches on cut stumps = 3% per plot
  - Incomplete cuts = 1% per plot
- Density** (using 3.57 m radius (40 m^2) plots where 1 "in" tree represents 250 trees/ha): 2,000 - 3,500 crop trees/ha
- Voids: All untreated areas larger than 0.04 ha are considered voids and will be deducted to calculate net treated area. All voids 0.5 ha and larger are to be mapped. When measuring a void a growing space of 1 m is allowed on crop trees.

*Includes all competing tree species such as but not limited to: pin cherry, grey birch, alder, and aspen. The only brush species considered as competition is beaked hazelnut.

** Generally the mid-range of stated densities should be aimed for as the ideal. The range is to allow some flexibility for individual situations.

Sampling Procedures: Stocking and density plots must share the same plot centre.

- Plot intensity: greater of one plot pair per ha or 4 plot pairs per work area.

Appendix 3: Site Preparation

Objective: To use trenching, dragging or plowing equipment to expose suitable mineral soil for planting seedlings and to reduce undesirable natural regeneration which will compete with the planted seedlings. This treatment may not be required on certain planting sites.

Pre-treatment Assessment

All Sites:

- Planting Opportunities: the number of favorable planting opportunities < 1500/ha and no cost-effective alternative is available to create sufficient planting opportunities.

Forest sites - the following sites resulting from harvesting may be treated:

- Softwood and Softwood-Hardwood sites (pre-harvest stand types) with < 60% softwood crop tree stocking (using 1.26 m radius (5 m^2) plots where one "in" tree represents stocked.
- Intolerant Hardwood and Intolerant Hardwood-Softwood sites (pre-harvest stand types) with < 60% stocking of acceptable crop tree species and with non-commercial woody species competition < 4 m average height.
- Remnant overstory: less than 25% crown closure (8 m^2/ha residual basal area).

  Note: Harvested Tolerant Hardwood and Tolerant Hardwood-Softwood sites (pre-harvest stand types) will not be treated.

Former Agricultural Fields:

- Sites must be of above average site quality, and must not show signs of impeded drainage (sites with soil gleying must be avoided).
- May be treated where existing vegetation significantly impedes planting or is present to the extent that it would retard the establishment of planted seedlings.
- Use of a brush hog is acceptable where > 60% of planting opportunities are overtopped by woody species. Herbicide site preparation may be required before planting.
- Mowing of predominately non-woody vegetation is not eligible.
- Use of a mulching head, hydro Axe, Marden Rollers, or other heavy equipment is acceptable with prior ERD approval and where the site is at least 95% occupied by non-commercial woody species > 3m in height.
- 100% of the work area must be treated (no spot or band treatment).
- Any approved heavy mechanical site prep treatment should be coded for the appropriate machine.

Post-treatment Inspection

- Potential for stocking: Sufficient favorable planting opportunities to accommodate a minimum of 90% crop tree stocking (using 1.26 m radius (5 m^2) plots where one "in" tree represents stocked.
- Planting opportunity: a location with access to mineral soil and where competing vegetation will not significantly impede the development of the seedling for at least 12 months from the scheduled time of planting.

- Untreated areas: inoperable areas that are too wet and/or rock outcrops, larger than 0.04 ha are considered voids and will be deducted to calculate net treated area. All voids 0.5 ha and larger are to be mapped and must be excluded from the final submitted shapefile.

Appendix 4: Fill Planting

Objective: To speed up stand growth by adding trees of desirable species where natural regeneration or previously planted trees are not fully occupying a site.

Pre-Treatment Assessment

- Stocking: ≤ 60% of all acceptable softwood and hardwood crop tree species (using 1.26 m radius (5 m^2) plots where one "in" tree represents stocked).
- Planting Opportunities: Must have sufficient natural regeneration plus planting opportunities to accommodate 90% stocking. Sites must be stratified to identify fill-planting areas.
- Initial planting failure: sites with poor planted tree survival due to site quality constraints (excessively wet or dry) or insect, animal or disease damage which are likely to persist are not eligible.
- ERD must review and approve each fill-planting site recommendation.

Post-Treatment Inspection

- Species: Planted seedlings must be native commercial softwood species and/or Norway spruce. Wild seedling transplants are not acceptable.
- Stocking: ≥ 90% planted and natural trees with 30 - 60% stocking of planted trees only.
- Density: 1,800 - 2,500 planted plus natural seedlings/ha for forest sites**,** and 1,800 - 3,000 for farm land sites (using 3.57 m radius (40 m^2) plots where 1 “in” tree represents 250 trees/ha)
- Quality: A seedling is considered meeting requirements if all the following criteria are satisfied (using 3.57 m radius (40 m^2) plots):
  - Alive or estimated to have been alive when planted and planted properly,
  - Firmly imbedded to the root collar,
  - Roots must have mineral soil contact; no exposed roots,
  - Not broken below the top whorl,
  - Multiple stems are counted as one,
  - located on an acceptable planting opportunity.

Sampling Procedures: Stocking and density plots must share the same plot centre.

- Plot intensity greater of one plot pair per ha or 4 plots pairs per work area.

Natural Regeneration: see Appendix 5

Moisture Conditions: see Appendix 5

Seedling Care: see Appendix 5

Appendix 5: Plantation Establishment

Objective: To speed up stand regeneration and determine which tree species will grow on the site. This treatment often requires site preparation prior to planting as well as herbicide soon after planting to control competing regeneration and is only recommended where desirable natural regeneration does not quickly establish itself after harvesting.

Pre-Treatment Assessment:

- Harvesting method and layout: Since harvesting creates the forest planting site, harvests should be designed with cost-effective site preparation, planting and herbicide release in mind. Harvesting and site preparation should avoid seasonally wet, dry or otherwise low productivity areas, use smooth boundaries and avoid excessive slash or significant future competition for planted trees. Planting should not occur within set-backs/buffers where herbicide release treatment is not feasible.
- Stocking: ≤ 60% of all acceptable softwood and hardwood crop tree species (using 1.26 m radius (5 m^2) plots where one "in" tree represents stocked).
- Planting opportunities: Must have sufficient natural regeneration (see below) plus planting opportunities to accommodate ≥ 90% stocking.
- Remnant overstory: less than 25% crown closure (8 m^2 residual basal area**)**
- Harvested Tolerant Hardwood and Tolerant Hardwood-Softwood sites (pre-harvest stand types) will not be treated.

Post-Treatment Inspection:

- Site: the site must not be excessively wet
- Species: Planted seedlings must be native commercial softwood species and/or Norway spruce (see below for seedling size specifications). Seedling species should be appropriate for the site to optimize growth. Wild seedling transplants are not acceptable.
- Stocking: ≥90% planted and natural trees and have ≥ 60% stocking of planted trees only.
- Multiple commercial species: acceptable provided they are appropriate for the site and compatible with one another as future crop trees.
- Density: 1,800 - 2,500 planted plus natural seedlings/ha for forest sites**,** and 1,800 - 3,000 for farm land sites (using 3.57 m radius (40 m^2) plots where 1 “in” tree represents 250 trees/ha)
- Quality: A seedling is considered meeting requirements if all the following criteria are satisfied (using 3.57 m radius (40 m^2) plots):
  - Alive or estimated to have been alive when planted and planted properly,
  - Firmly imbedded to the root collar,
  - Roots must have mineral soil contact; No exposed roots,
  - Not broken below the top whorl,
  - Multiple stems are counted as one,

- located on an acceptable planting opportunity

- Setbacks: are set forth in the ELG permit requirements for vegetation management and must have no planted seedlings within them.

Sampling Procedures: Stocking and density plots must share the same plot center.

- Plot intensity greater of one plot pair per ha or 4 plots pairs per work area.

Natural Regeneration: will not include the following:

- Layering,
- Seedlings with over 25% of circumference of stem girdled,
- Seedlings with a live crown ratio of less than 20%,
- Advanced stunted fir regeneration; this is advanced regeneration present following harvest. Generally this refers to trees over one metre in height with short "umbrella" shaped crowns exhibiting very poor annual growth.

Moisture Conditions: Boards are encouraged to monitor planting site moisture conditions on a daily basis, and to consider cessation of planting activity when sites become sufficiently dry to jeopardize seedling survival.
Boards are encouraged to view two key components of the Fire Weather Index: The Drought Code (DC) and the Buildup Index (BUI) at http://www.gnb.ca/public/Fire-Feu/actual.pdf. **DC** > **300**, and **BUI** > **55** have been identified as critical levels above which higher than normal seedling mortality rates may be expected.

In addition, daily precipitation should be monitored since acceptable Drought Codes can result from high humidity while soil moisture remains insufficient for seedling survival.
To view daily precipitation visit:
http://www1.gnb.ca/0079/FireWeather/FireWeatherHourly-e.asp?Stn=all
Seedling Care: Boards are responsible to ensure staff/contractors/owners are aware of and follow ERD best management practices for seedling care.

Appendix 6: Herbicide for Site Preparation and Plantation Release

Objective: To control regeneration forecasted to compete with planted seedlings by applying an herbicide product registered for forestry applications, using aerial or ground based treatment methods.

Pre-Treatment Assessment

- Initial Release Timing: Release treatments should normally take place the first or second growing season after planting. (see Appendix 6 for natural regeneration release criteria)
- Site Preparation prior to planting: site preparation treatment must occur after competing vegetation has achieved near full foliage (July) and planting may occur within the same growing season and must occur before the end of the next growing season.
- Stocking: > 75% softwood (planted and natural) stocking (using 1.26 m radius (5 m^2) plots where one "in" tree represents stocked).
- Competition: Hardwood, woody brush and/or herbaceous weeds occupy ≥ 80% of site; ≥ 40% of the planted crop trees are overtopped, show growth interference or are expected to become overtopped
- Crop tree protection: Initial release treatment cannot be within the year of planting, unless approved by ERD.
- Second Release Timing: Any second release treatment must occur within 4 growing seasons following planting and be recommended by Year 3 Plantation Performance Monitoring (see Appendix 11), unless otherwise approved by ERD.
- Regulations: A Pesticide Use Permit must be obtained from ELG, authorizing the application of any herbicide treatment, either by ground or by air, before any operations commence.

Post-Treatment Inspection

- Competition Control: < 25 % of the area stocked to softwood is showing growth interference with hardwood, woody brush and/or herbaceous weeds that is overtopping or expected to overtop the crop species
- Untreated areas: inoperable areas larger than 0.04 ha are considered voids and will be deducted to calculate net treated area. All voids 0.5 ha and larger are to be mapped and must be excluded from the final submitted shapefile. The Marketing Board should download the GPS navigational data from the herbicide application vehicle to determine the area treated.
- Performance Reporting: Each treatment site must be inspected by the Marketing Board during the spring growing season immediately following treatment to determine compliance with the above “Competition Control” criteria. Each Marketing Board will submit, not later than August 1st of the year following treatment, a list of any sites where the treatment was unsuccessful.

- Re-treatments: Each Marketing Board will submit, not later than November 30th of the year of treatment, a list of any sites receiving re-treatment due to a rating of unsuccessful.

Sampling Procedures: Plot intensity greater of one plot per ha or 4 plots per work area.

Appendix 7: Herbicide for Natural Regeneration Release

Objective: To control regeneration forecasted to compete with desirable natural regeneration by applying a herbicide product registered for forestry applications, using aerial or ground based treatment methods.

Pre-Treatment Assessment

- Stocking: > 75% softwood stocking (using 1.26 m radius (5 m^2) plots where one "in" tree represents stocked).
- Competition: Hardwood, woody brush and/or herbaceous weeds occupy ≥ 80% of site; ≥ 40% of the natural regeneration are overtopped, show growth interference or are expected to become overtopped.
- Remnant Overstory: < 50 stems/ha (>10cm dbh class)
- Tolerant Hardwood: < 40% of crop tree competition is tolerant hardwood
- Regulations: A Pesticide Use Permit must be obtained from the NB Department of Environment, authorizing the application of any herbicide treatment, either by ground or by air, before any operations commence.

Post-Treatment Inspection

- Competition Control: < 25 % of the area stocked to softwood is showing growth interference with hardwood, woody brush and/or herbaceous weeds that is overtopping or expected to overtop the crop species
- Untreated areas: inoperable areas larger than 0.04 ha are considered voids and will be deducted to calculate net treated area. All voids 0.5 ha and larger are to be mapped and must be excluded from the final submitted shapefile. The Marketing Board should download the GPS navigational data from the herbicide application vehicle to determine the area treated.
- Reporting: Each treatment site must be inspected by the Marketing Board during the spring growing season immediately following treatment to determine compliance with the above “Competition Control” criteria. Each Marketing Board will submit, not later than August 1st of the year following treatment, a list of any sites where the treatment was unsuccessful.

Sampling Procedures: Plot intensity greater of one plot per ha or 4 plots per work area.

Appendix 8: Woodlot Management Recommendations

Objective: To develop written woodlot management recommendations for individual forest properties. These recommendations may relate to timber, ecological values or personal enjoyment and may be part of an overall forest management plan.

Property Size and Rate Paid

- Minimum Size: must include at least one PID ≥ 5 ha
  - < 10 hectare property*: $200
  - 10 - 40 hectare property: $500
  - ≥ 40 hectare property: an additional $5/ha for each ha above 40 ha to a maximum of $600
- Multiple PID's: should be incorporated into a single document, so long as all PID's are adjacent to each other, or are separated from each other by a trail, road, railroad, utility corridor or highway. All PID's described in a document must be identified on the certification form.
- Assessment: The entire property (as designated in the Woodlot Management Recommendations document) must be assessed. Recommendations are not to address only a portion of a PID parcel or adjacent PID parcels.
- * Less than 10 ha properties are not eligible if another program treatment is received in the same or previous year

Components

- Format: flexible but must be a written document with the signature of a Certified Forest Technician or Registered Professional Forester.
- Map: Scale sketch or aerial photograph of property, including delineation of all stands, access roads and non-productive portions of the property.
- Stand Description: includes but is not limited to species composition by % basal area or volume, age, height, dbh, as well as overall site productivity.
- Treatments: recommendations for the next 10 year's activities may include treatments under the Private Woodlot Silviculture Program or other activities to achieve the owner's objectives
- Long-term resource considerations*:* One or more of the following items should be noted as part of an overall property description:
  - Wetlands
  - Forest health
  - Historical, cultural & archaeological sites, other special sites
  - Protection from fire
  - Soil & water quality protection
  - Biodiversity and wildlife habitat

- Carbon sequestration
- Recreation opportunities

Records: The owner/manager of the property must be provided with a signed copy of the woodlot management recommendations, and a copy retained in Marketing Board files, including a digital map of the management plan area (GPS boundary). Such treatment records must be made available to ERD staff upon request.

Frequency: Only one woodlot management recommendations treatment per property every 5 years under this program.

Appendix 9: Commercial Thinning

Objective: To improve the growth and quality of desired stems in plantations and pre-commercially thinned stands by removing stems with lower potential and releasing the remaining desired stems which increases growth rate and promotes higher valued products. This treatment is part of an even-age silviculture system.

Pre-Treatment Assessment:

- At least 20 year old plantations or 25 year old pre-commercial thinning (stand age) or agricultural field white spruce
- Not older than 40 years (stand age) or 45 years for agricultural field white spruce
- Less than 40m^2/ha BA
- Moderately well to well-drained without evidence of unacceptable risk of windthrow, pest or disease damage and within ecosite 5 or 7 (DNR Ecosite Classification)
- Live crown ratio > 35% (dominants & co-dominants)
- Stands that have trees with root masses the are predominantly shallow are not eligible
- Woodlot owner signed agreement on plan objectives and timeline
- See additional Stand Assessment Guidelines below

Post-Treatment Inspection:

- Removed between 25% and 40% BA (including trails) with minimum of 16m^2/ha in leave strips (between trails)
- Thinned from below using consistent pattern (areas > 1000 m^2 either untreated or residual BA < 15m^2/h must be mapped out)
- Less than 20% BA trembling aspen, tamarack, white birch, red pine and/or jack pine
- Extraction trails should be laid out and flagged in straight lines in order to keep the leave strip a consistent width and prevent the trails from converging.
- Leave strip between the two trails should be 16 m (≥ 80% of the leave strips in the block must have widths between 15 and 17 m)
- Pecking order: defective, damaged or likely not to survive; conifers with non-vigorous crowns (<30% live crown ratio); intolerant hardwoods; fir, spruce, pine, hemlock, cedar
- Residual damage incidents < 10% of residual trees by BA (exposed sapwood greater than 200 cm^2 ; > 20% crown damaged; > 20% root system damaged)
- Crop trees should have 3-4 sides of the crown released

- Trails should be ≤ 5 m

Sampling

- Plot intensity greater of one plot per ha or 4 plots per work area.

Stand Assessment Guidelines (additional methods of assessing suitability for treatment):

- Avoiding windthrow: Height to diameter ratio on crop trees less than 80
- Targeting productive sites: Site index > 15m @ 50 years
- Initial density of quality trees: Minimum 1000 potential crop trees/ha by assessing Acceptable Growing Stock density versus Unacceptable Growing Stock density (pg.42, Pelletier, G., Landry and M.Girouard. 2013. A Tree Classification System for New Brunswick. Northern Hardwood Research Institute. Edmundston, New Brunswick)

Appendix 10: Hardwood Stand Improvement

Objective: To improve the growth and quality of desired trees in hardwood-dominated stands with abundant tolerant hardwood species by removing stems at risk of losing value and reducing competition among remaining crop trees which increases growth rate and promotes higher valued products. This treatment is part of a 2-aged or uneven-aged silvicultural system.

Pre-Treatment Assessment:

- Between 26 and 40 m^2/ha BA (>10 cm dbh class)
- 60% of BA in acceptable tolerant species (sugar maple, yellow birch, beech, ash, basswood, beech, oak, butternut, ironwood, <10% red maple)
- > 40% of total BA (>10 cm dbh class) are quality potential* (may include <10% quality spruce, pine, hemlock, cedar)
- Moderately-well to well drained, without evidence of unacceptable risk of wind throw, pest or disease damage and within Ecosite 5 or 7 (DNR Ecosite Classification)
- 10 years since last harvest treatment
- Stands treated under the *New Brunswick Sugar Bush Silviculture Funding Program* are not eligible
- Woodlot owner signed agreement on plan objectives and timeline
- Prescription form with required components submitted to ERD Regional staff

Post-Treatment Inspection:

- Removed between 20% and 40% BA (including trails)
- > 75% of BA in acceptable tolerant species
- > 50 % of total BA are quality potential*
- Less than 15 residual trees/ha > 50 cm dbh**
- Thinned using consistent pattern (areas > 1000 m^2 either untreated or residual BA < 15m^2/ha must be mapped out)
- Crop tree spacing (> 80% of crop trees released on 3 sides)
- Trails < 5 m
- Pecking order: defective, damaged or likely not to survive 10 years; conifers with non-vigorous crowns (< 30% live crown ratio); intolerant hardwood, fir, spruce, pine, hemlock, cedar
- Residual damage incidents < 10% of residual trees (exposed sapwood greater than 400 cm^2; > 20% crown damaged; > 20% root system damaged)
- No intentional removal of desirable regeneration and saplings

Sampling

- Plot intensity greater of one plot per ha or 4 plots per work area.

* quality tree potential (acceptable growing stock) = contain or have potential to contain at least 1 pallet log > 2.6 m in length and > 10 cm dbh (no rot, dry or dead wood; straight, no spiral cracks; NHRI tree form and risk rating guide shall be used to assess quality tree potential)

Stand Assessment Guidelines (additional methods of assessing suitability for treatment):

- Avoiding windthrow: Height to diameter ratio on crop trees less than 80
- Targeting productive sites: Site index > 15m height @ 50 years
- ** Coarse Woody Debris density: where possible leave residual large diameter trees (~5/ha)
- Quality tree potential: >50% Acceptable Growing Stock (pg.42, Pelletier, G., Landry and M.Girouard. 2013. A Tree Classification System for New Brunswick. Northern Hardwood Research Institute. Edmundston, New Brunswick)

Appendix 11: Operating Plan

Objective: To support the transfer of advice from marketing boards to woodlot owners for partial harvesting operations which encourage maintenance, regeneration and growth of tolerant species. This advice includes possible harvested products, buyers, contractors, operating methods, best management practices, marking example areas, visits to demonstration sites. The intent is to promote alternative treatments which are part of even-aged, 2-aged and uneven-aged silviculture systems and which increase the growth rate and value of the resulting stands.

Criteria:

- Must result in harvest alternatives to clearcut regeneration including crop tree release, shelterwood, irregular shelterwood, selection, strip/patch treatments
- Site must be without evidence of unacceptable wind throw, pest or disease risk
- Does not include pre-merchantable thinning or semi-commercial thinning
- Must include an objective to encourage maintenance and/or improvement and/or regeneration of key tolerant tree species (basswood, elm, ash, oak, butternut, hemlock, cedar, white pine, ironwood, red spruce, white spruce, sugar maple, yellow birch)
- Less than 20% residual BA can be comprised of trembling aspen, tamarack, white birch, red pine and/or jack pine
- Treated using consistent pattern (areas > 1000 m^2 either untreated or residual BA < 15m^2/ha must be mapped out)
- Woodlot owner signed agreement on plan objectives and timeline
- Prescription form with required components submitted to ERD Regional staff
- The Marketing Board administration deduction rate will match that of Commercial Thinning and Hardwood Stand Improvement treatments

Operating Plan Components:

- A completed operating plan (form) with required components must be provided to the owner and kept on file at the Marketing Board
- Digital map file
- Photos of stand(s) pre-treatment.
- Site productivity assessment
- Possible products and amounts from target stands, buyers and prices for these products
- List of possible contractors, consulting forestry professionals
- Operating methods, equipment selection

- Best Management Practices
  - Forest Management Plan
  - Road/trail building
  - Watercourse protection
  - Machine damage/Soil disturbance
  - Habitat and biodiversity
  - Special sites

- Signature of a Registered Forest Technician or Registered Professional Forester

Appendix 12: Plantation Performance Monitoring - Year 3 & Year 8 or 9

Objective: To document plantation performance and to initiate release or cleaning treatment activities as warranted.

Reporting Requirements

- For all plantations established under this or other provincially funded programs, reports are to be submitted indicating the growth status during their 3rd and 8th or 9th year of development. The administration funding provided by the program to Marketing Boards is intended to cover the cost of this performance monitoring activity.
- Year 3 reports based on walk-through estimates should include the following:
  - Plantation job number; area, crop tree stocking, total softwood stocking, percent stocked softwood overtopped, showing growth interference or expected to become overtopped.
  - Recommendation (herbicide release vs. no action required) and scheduled time of planned release. Sites recommended for herbicide release treatment must meet criteria described in Appendix 5.
- Year 8 or 9 reports, based on stocking and density plots should include the following:
  - Plantation job number; area, crop tree stocking, total softwood stocking.
  - Percent softwood stocked plots overtopped by competition including hardwood.
  - Total density of all commercial species including hardwood.
  - Recommendation (cleaning vs no action required) and scheduled time of required cleaning. Sites recommended for cleaning treatment must meet criteria described in Appendix 1.

Appendix 13: Required Plot Sizes for Pre-Treatment Assessment & Post-Treatment Inspections

Density		
Activity	**Pre-Treatment**	**Post-Treatment**
Thinning & cleaning	6.7 m^2, 1.46 m radius 1/1,500 ha	40 m^2, 3.57 m radius 1/250 ha
Fill planting & full planting	N/A	40 m^2, 3.57 m radius 1/250 ha
Herbicide site preparation or release	No requirement	No requirement

Stocking		
Activity	**Pre-Treatment**	**Post-Treatment**
Thinning & cleaning	5 m^2, 1.26 m radius 1/2,000 ha	5 m^2, 1.26 m radius 1/ 2,000 ha
Fill planting & full planting	5 m^2, 1.26 m radius 1/ 2,000 ha	5 m^2, 1.26 m radius 1/ 2,000 ha
Herbicide site preparation or release	5 m^2, 1.26 m radius 1/ 2,000 ha	5 m^2, 1.26 m radius 1/ 2,000 ha

Planting Opportunities		
Activity	**Pre-Treatment**	**Post-Treatment**
Site Preparation	5 m^2, 1.26 m radius 1/ 2,000	See planting stocking

Appendix 14: Landowner Agreement

Landowner Agreement for Participation in the Department of Energy and Resource Development (ERD) 2018-19 New Brunswick Private Woodlot Silviculture Program

Background: The New Brunswick Private Woodlot Silviculture Program has provided financial incentive to landowners interested in conducting specific silvicultural treatments on private woodlots. The program targets stand establishment activities (site preparation and plantation establishment), early interventions (herbicide, plantation cleaning and pre-commercial thinning), and stand improvement harvests (commercial thinning, hardwood stand improvement and operating plans) all of which necessitate a number of decades for the benefits to mature.

Program assistance is available on properties providing the following conditions are met;

- all program requirements and treatment criteria listed in this manual are met;
- the registered landowner agrees in writing to manage the property in a manner consistent with the time frame necessary to produce primary wood products;
- the registered landowner agrees to repay moneys received under this program should they fail to manage area that is treated under this program prior to the production of primary wood products, and;
- ERD staff members may enter upon and pass through these private properties without being liable for trespass at any time during or after treatment in order to check compliance with criteria, rules and regulations outlined in this manual.

LANDOWNER AGREEMENT:

I _____ (print) am the registered landowner of the property identified by PID #_____. I have read and understand this document. I agree that in accepting financial assistance under this program, I am committing this property to the production of primary forest products. I understand and acknowledge that production of primary forest products is a process that typically requires a time

frame measured in decades. I agree to manage this property in a manner consistent with the time frame necessary to produce primary wood products. I agree to allow ERD staff members to enter upon and pass through my properties at any time during or after treatment to check compliance with criteria, rules and regulations outlined in this manual. I also agree to repay moneys received under this program should I fail to manage area that is treated under this program prior to the production of primary wood products. I acknowledge that I have read the *2018-19 New Brunswick Private Woodlot Silviculture Manual* and understand the contents within. I understand that ERD has made subsidies available to the landowner for silviculture activities (Table 1) on private woodlots.

_____ _____

Signature of Registered Landowner Date

Marketing Board Section

I _____ (print), of the _____(Marketing Board) shall supervise all operations pertaining to the silviculture treatments undertaken within this agreement and will ensure that the quality of the work completed meets the criteria stipulated in the *2018-19 New Brunswick Private Woodlot Silviculture Manual*.

_____ _____

Signature of Marketing Board RPF or RFT Date

Example Rates

Treatment	*Rate/ha (ERD Contribution)*
Tree Planting	$710
Site Prep-Disc Trencher	$351
Aerial Herbicide	$222
PCT	$958
Operating Plan	$400

*See Table 1 for complete list of the treatment rates

(This document is needed for each PID and should be attached to the activity certification form and maintained within Marketing Board records. Prescription forms that are submitted to ERD staff should have a copy of this agreement attached.)