NFRM

Nipissing Forest Resource Management

“Integrated Pest Management”

Version 5.0 May 2025

1.0 Introduction

This integrated pest management (IPM) approach is designed to address the use of chemical pesticides, including herbicides and insecticides, on the Nipissing Forest. In general, Nipissing Forest Resource Management Inc. (NFRM) is the principal proponent of herbicide use while the Ministry of Natural Resources (MNR) is the principal proponent of insecticide use. Herbicide use on the Nipissing Forest is more common than insecticide use. The principles in this integrated use approach are focused on herbicide use but also apply when insecticide use is contemplated or implemented. Those specific situations will be documented.

NFRM believes in applying best management practices to each forest site ensuring that silvicultural prescriptions are effective and Forest Management Planning (FMP) objectives, related to the future forest condition, will be met. NFRM considers that its use of herbicides for forestry purposes is safe and effective, and through implementation of this document, has minimal adverse environmental impacts. Since there are presently no economically feasible non-chemical alternatives for large-scale forestry use, the application of herbicides must remain in NFRM's silvicultural tool kit. NFRM intends to minimize herbicide use through judicious planning and application, while continuing to monitor advances made in field-proven science and technology.

This integrated pest management approach involves steps to characterize and map candidate treatment blocks according to the need for tending, selection of the appropriate application method and equipment, available site-specific herbicides, use of the best available technology, careful implementation using all safety precautions, and use of fully trained staff and contractors. This integrated, site-specific approach ensures that the use of herbicides is minimized, while ensuring management objectives are met.

2.0 Insect Management Context

There has been no large scale/aerial application of insecticides on the Nipissing Forest during the period that NFRM has been conducting forest management (April 1996). Part D, Section 6, of the Forest Management Planning Manual 2024 describes the Integrated approach to developing and implementing Insect Pest Management Programs. In general, if MNR led monitoring efforts identify a major pest infestation then a program will be developed. An interdisciplinary team, led by MNR Forest Management Branch, including representation from NFRM and other stakeholders, would consider several possible management options. If the selected course of action involves aerial application of insecticides, then a planning/consultation/approval process, similar to that for herbicides, is engaged. NFRM's role is essentially to facilitate the implementation of the selected management option which may also include modifications to forest harvesting plans.

Biological control agents (e.g., Bt) are used only where other non-chemical pest control methods are, or can reasonably be expected to be, ineffective. The rationale for the use of biological control agents is documented and based on scientific evidence. There has been no recent use (since 1996 when NFRM started managing) of biological control agents on the Nipissing Forest. Use of biological control might be considered under conditions of insect outbreak posing a serious threat to wood supply or to a tree specie of local concern (red spruce). Any use of biological control is strictly regulated in Ontario by the Integrated approach documented in the referenced Planning Manual.

Tree Improvement activities on the Nipissing Forest SFL are primarily conducted on a site located in Gurd Township. The long-term strategies for tree improvement at the Gurd site were originally developed by the MNR. The annual activities that occur at the Gurd Site are generally planned and implemented by a group of interested parties composed of: NFRM, Northeast Seed Management Association (NESMA), Forest Gene Conservation Association (FGCA), and MNR Science staff. NFRM has facilitated a one-time ground-based application of insecticide at the Gurd site consistent with this IPM document.

3.0 Vegetation Management Context

The Nipissing Forest supports many different forest tree species that have a broad range of ecological inputs (sunlight, moisture and nutrients) required for growth. Vegetation management is the means by which a competitive advantage (ability to capture ecological inputs) is afforded to one or more desired forest tree species over other forest vegetation. This mechanism is required to influence development toward a desired condition or structure to meet several management objectives. More generally, NFRM has a legal requirement to maintain a variety of forest compositions that include a conifer component.

The five principle elements of the NFRM vegetation management strategy are:

- Autecology Information - knowledge of the reproduction strategies and the ability to compete for resources for both desired and non-desired forest vegetation.
- Response to Disturbance - knowledge of how non-desired forest vegetation responds to harvesting, site preparation, and tending.
- Treatment Options - knowledge of treatment options that can be practically applied through harvest and/or silviculture to either ***minimize*** the development of competing vegetation or ***reduce*** existing competing vegetation.
- Treatment Efficacy - knowledge of the degree to which a specific treatment can provide a required competitive advantage to desired forest tree species obtained through current research and local monitoring.
- Environmental Impacts - knowledge of the environmental consequences of each vegetation management treatment option.

There are three Silviculture Systems employed on the Nipissing Forest under which forest management activities (harvest and renewal) occur. Each one of these systems (Clearcut, Shelterwood, and Single Tree Selection) is prescribed and implemented based on groupings of forest tree species with similar silvicultural and ecological aspects. Vegetation management traditionally begins with harvesting where varying proportions of the canopy are removed. Those variations of canopy removal distinguish the silviculture systems from each other. Within each system, subsequent treatments (site preparation and tending) are applied to provide competitive advantage to desired tree species.

NFRM applies a suite of vegetation management treatments that complement harvesting within each silviculture system. These treatments are generally applied post-harvest; however, some are applied concurrent with the harvest.

Options for Vegetation Management

Non-Herbicide	**Herbicide**
Mechanical site preparation	Aerial spray
Brushsaw tending	Skidder-mounted ground spray
Pre-commercial thinning, conifer	Backpack Manual Spray
Commercial thinning	
Stand Improvement, concurrent with harvest	
Stand Improvement, non-concurrent with harvest	
Prescribed burning / fire	

The following table summarizes the amount of vegetation management treatments undertaken on the Nipissing Forest since 1996.

Nipissing Forest Vegetation Management 1996 through 2024

	Site Preparation Treatment		Tending Treatment		Total Vegetation Management		
	Herbicide	Non-Herbicide	Herbicide	Non-Herbicide	Herbicide	Non-Herbicide	Total
Area(ha)	9375	10606	21383	25403	30758	36009	66767
%	14%	16%	32%	38%	46%	54%	100%

Although herbicide-based treatments account for a minority of the total area treated to date, it remains the most controversial approach to vegetation management. As such, when NFRM prescribes a herbicide-based treatment it is done within the context of Judicious Use. See Appendix 1; flowchart titled "Decision Making Process for the Judicious Use of Herbicides" (2025).

4.0 Elements of an Herbicide Use Management Strategy

The approach to herbicide use on the Nipissing Forest is composed of several elements. The combination of the five elements provides a strategy that balances social, environmental, and forest resource aspects.

Element #1 restricts NFRM to using only those herbicides specifically regulated for forestry use by Health Canada and are deemed acceptable by third party certification systems.

Element #2 focuses NFRM efforts on implementing processes and actions designed to avoid or minimize herbicide use. This may include factors such as amount of crown opening, season of harvest, or keeping forest floor mat intact. NFRM is firmly committed to a process of Judicious Use which documents all the steps/aspects of deciding and rationalizing targeted applications.

Element #3 ensures that NFRM continues to test, develop, and implement non-chemical methods of vegetation management. Sole reliance on herbicides for all vegetation management requirements is neither sustainable nor balanced.

Element #4 requires a detailed review of the outcomes of previous vegetation management treatments with respect to their effectiveness in achieving forest management objectives. The emerging trends resulting from these analyses provide the basis for rationalizing the current and future decisions concerning vegetation management.

Element #5 ensures that, when herbicide use is prescribed, NFRM is bound to strict compliance with all laws and regulations related to chemical and herbicide use. Only forestry herbicides approved by Health Canada and deemed suitable by the Forest Stewardship Council are used. Safe and careful use will minimize all potential risks to human health and adverse environmental impacts. Use of only Licensed applicators combined with regular compliance audits ensures careful use. NFRM recognizes that trained and professional staff will be used to assess vegetation management needs, and to provide continuing education opportunities for those personnel.

4.1 Do not use chemical pesticides that are prohibited by our third-party certifier.

Maintaining third party certification requires that we confine our use of pesticides to those not deemed "prohibited". NFRM only uses herbicides approved by the Health Canada Pest Management Regulatory Agency as safe and effective. NFRM believes that the PMRA is one of the most rigorous testing systems for forestry herbicides in the world and indicates substantial current scientific evidence of environmental safety. NFRM uses primarily glyphosate-based and to a lesser degree triclopyr-based herbicides.

4.2 Implement processes and actions designed to minimize or avoid chemical pesticide use, whenever possible.

a) Strict Adherence to Judicious Use

The process followed by NFRM that supports and guides vegetation management, specifically using herbicides, is documented in the flowchart titled "Decision Making Process for the Judicious Use of Herbicides" (appendix 1).

This approach involves steps to characterize and map candidate sites according to the need for vegetation management. At this stage, the question of whether a non-herbicide-based method can achieve the management objective is posed. The answer forms part of the rationale for the decision to use herbicides.

If herbicide use is found to be necessary, careful consideration is given to any developing trends appearing from the results of annual efficacy monitoring. The selection of the site-specific herbicide, application rate, application method and equipment is influenced by those emerging trends.

During the process to refine the precise location where herbicide is to be used, opportunities to exclude area from application will be examined.

The MNR reviews all proposed treatment areas prior to implementation to ensure that other forest values have appropriate protection. Sites prescribed for aerial application pass through an additional level of scrutiny and permitting by the MECP. Examination of the rationale for use and approval of the Implementation Plans is also conducted.

NFRM will make use of the best available application technology (e.g. nozzle and navigation) to ensure that the right amount of product is applied in the right place. NFRM has representatives on site to ensure careful implementation of all safety precautions.

The point of this integrated, site-specific approach is to ensure that management objectives are met and that the use of herbicides is minimized.

b) Continuous Annual Monitoring

NFRM is committed to closely monitoring the effects of prescribed herbicide use. This feedback loop is essential for refining decisions on all aspects of usage: varying rates of herbicide, total mix volumes, threshold levels of tolerable vegetative competition, choice of herbicide, herbicide rate/ha, carrier (i.e. water) rate/ha, droplet size, timing, climate conditions.

Ground surveys are conducted during the following growing season on areas that received herbicide applications to assess the following:

- the efficacy based upon the percent coverage of the site, and the control of the target vegetation;
- any damage to crop trees;
- any evidence of off-target application;
- recommendations for the next action

c) Use and Development of Techniques to Minimize Use

NFRM is committed to using the least amount of herbicide possible and will continually utilize approaches to vegetation management that have been or may be proven to be effective.

Techniques currently being used that do or may result in lower herbicide usage:

- Conduct intensive mechanical site preparation - if soil depth and texture are suitable for heavier mechanical work (no diminishment of forest productivity), the entire surface organic layer which includes the "seedbank" can be removed prior to tree planting.
- Planting of large, vigorous, well balanced, stock capable of tolerating increased levels of competition that would result from less use of herbicide.
- Carefully selecting sites targeted for conifer planting which are not excessively fresh or rich that would require significant levels (more than 2 treatments) of vegetation management.
- Continued use of high volume/low-drift application technology when aerially applying herbicides to white pine shelterwoods. Large droplets resulting from doubling the amount of mix water/ha increases canopy penetration. This allows more mix to reach the target vegetation on the forest floor. This concept has been tested both at the experimental and operational scales.
- Precisely targeted applications using backpack sprayers. These application methods are generally limited to a small scale due to low relative productivity coupled with the short application season. Continued and possible increased use of manual application methods, however, will effectively result in lower total herbicide use.
- Regular use of GPS guidance systems in both ground-based skidder and aerial applications. This provides real-time navigation to assist the operator/pilot in applying evenly spaced swaths over the project block. In addition, this navigation system provides functionality to the operator/pilot that warns him when block boundary and areas of concern are in his travel/flight path. Digital electronic data showing the project area, from a Geographical Information System (GIS), is typically up-loaded into the skidder/aircraft guidance system and appears on a moving map display within the operator/pilot’s view, during application. This essentially eliminates the need for supplemental application aimed at treating the

gaps missed during the first application and minimizes the potential for treating areas outside of the approved block.
- Prescribed fire / burnig: under the right circumstances, controlled and carefully planned use of fire may reduce the need for herbicide, primarily by reducing woody vegetation. Fire may, however, stimulate sprouting and other competitive species, therefore should not be expected to replace herbicide use.

Possible Techniques to be developed that may result in lower herbicide usage:

- Developing white and red pine restoration strategies/prescriptions where red pine is planted in recent clearcuts followed by density control treatments (pre-commercial and commercial thinning). This could enable the establishment (planting) of white pine approximately 20 years prior to the final harvest of red pine under a partial canopy thus mimicking natural processes. Deep, coarse textured soils, optimal for growth of red/white pine, would likely have a lower amount of competing vegetation.
- Developing prescriptions to establish semi-tolerant conifers (white spruce and white pine) in strips within/between advanced growth intolerant hardwoods (poplar, white birch). Utilize precisely targeted methods of vegetation control versus more broadcast type approaches.
- Conducting spray application modelling work using AgDISP in Spray Advisor to explore various application technologies (boom and nozzle) and mix rates that result in the highest amount of spray mix reaching the ground with the least amount of herbicide to satisfy the vegetation management objective.
- Establishing red oak growing stock in the understory of suitable Shelterwood stands prior to conducting regeneration harvests.
- Use of improvement cuts to clean out the understory followed by regeneration establishment (natural or artificial) may reduce or eliminate the need for tending treatments.
- As stated above, re-introducing prescribed fire may, in some cases, be an appropriate means of controlling some competition, although may also stimulate competition as well.

d) Forest Management & Tree Seedling Nurseries

All the nurseries that supply seedlings to NFRM are required to have integrated pest management policies, which describe guidelines for minimizing pesticide use and to ensure safe handling.

4.3 Test, develop, and implement non-chemical methods of vegetation management.

- Using higher than normal plantation establishment densities to capture sites early and quickly. Planting trees at 0.5-1 meter vs 1.8 meter spacing would result in less growing space being available for non-crop tree competition to develop. This approach would more closely emulate the natural development of conifer stands.
- Continued and possible increased use of brush saws and chainsaws (manual tending) when and where suitable.

4.4 Periodic review of Silvicultural Effectiveness

NFRM must conduct detailed surveys of all previously harvested sites to determine the degree to which those areas are successfully regenerating to specific standards. The results of these surveys indicate the effectiveness of the applied silvicultural treatments at achieving the intended outcome. These surveys are conducted from 5 to 20 years after an area has initially been harvested, depending upon the Silviculture System and tree species.

Analysis and reviews of survey results are currently documented in Annual Reports, Year 7 and Year 10 Annual Reports, and within each Forest Management Plan according to direction contained in the “MNR Forest Management Planning Manual”. These reviews document emerging trends and generate recommended changes to improve the effectiveness of renewal and tending operations. They also form an important component in the determination of forest sustainability.

The most recent documented reviews of Silvicultural Effectiveness are present in the 2018/2019 ten-year Annual Report. Important trends and recommended changes from those reports are necessary inclusions to this Strategy. They form the principal rationale for all current and future vegetation management practices. As subsequent reviews occur, this Strategy will be revised to incorporate any new directions.

Trends and recommendations from these reports direct and rationalize vegetation management on the Nipissing Forest, and include the following:

- Trees planted in clear cuts require further tending treatments to meet silvicultural success requirements.

- For white pine shelterwood regeneration cuts - a comprehensive tending program implemented as soon as competition is present on site will result in achieving a degree of regeneration success more consistent with the modelled 2019 FMP rate of 75%.

- Chemical site preparation treatments should be considered on sites where existing competition exists before planting.

- Pure conifer forest units need to be intensively managed to maintain their high conifer component.

- A rigorous monitoring program will ensure proper timing and selection of the most effective type of treatment.

Refer to “Appendix 2. Silviculture Effectiveness In Planted stands: Monitoring And Increased Tending Help Achieve Conifer Future Forest Units.”

4.5 When applying chemical pesticides, ensure that health and safety risks are minimized through strict compliance with all laws and regulations related to chemical and herbicide use.

Health Canada's primary objective in regulating pesticides is to protect Canadians' health and their environment. Pesticides must be registered by Health Canada's Pest Management Regulatory Agency (PMRA) before they can be imported, sold, or used in Canada. Pesticides must go through rigorous science-based assessments before being approved for sale in Canada.

All registered pesticides must be re-evaluated by the PMRA on a cyclical basis to make sure they continue to meet modern health and environment safety standards and continue to have value. In 2015, the PMRA published the outcome of its extensive re-examination of glyphosate for public comment which concluded that the products containing glyphosate do not present unacceptable risks to human health or the environment when used according to the revised product label directions.

During this re-examination, the PMRA assessed the potential human health risk of glyphosate from drinking water, food, occupational and bystander exposure, as well as the environmental risk to non-target organisms. Both the active ingredient and formulated products were included in the re-evaluation. The assessment was carried out based on available information provided by the manufacturer of the pesticide, as well as a large volume of published scientific literature, monitoring information (for example, ground water and surface water) and reviews conducted by other regulatory authorities.

The overall finding from the re-examination of glyphosate is highlighted as follows:

- Glyphosate is not genotoxic and is unlikely to pose a human cancer risk.
- Dietary (food and drinking water) exposure associated with the use of glyphosate is not expected to pose a risk of concern to human health.
- Occupational and residential risks associated with the use of glyphosate are not of concern, provided that updated label instructions are followed.
- The environmental assessment concluded that spray buffer zones are necessary to mitigate potential risks to non-target species from spray drift

(for example, vegetation near treated areas, aquatic invertebrates, and fish).
- When used according to revised label directions, glyphosate products are not expected to pose risks of concern to the environment.
- All registered glyphosate uses have value for weed control in agriculture and non-agricultural land management.

In Canada, five herbicide active ingredients are registered for aerial application to forests: glyphosate (trade names such as: Glysil and Vision Max), 2,4-D (various trade names), triclopyr (GarlonXRT and GarlonRTU), hexazinone (Velpar), and simazine. All these herbicides work by interfering with metabolic processes that are unique to plants. Birds and animals do not have these metabolic processes and these herbicides have little effect on them.

After a herbicide is registered for use in Canada, the Ministry of the Environment regulates its use in Ontario through the Pesticides Act (PA). The PA has extensive requirements regarding public notification and license requirements for users and sellers. The Ontario Pesticides Advisory Committee is to advise the MECP if a pesticide is compromising human health or environmental quality. The Pesticides Act and the Crown Forest Sustainability Act ensure that registered pesticides are used safely with due consideration for sustainability of the environment. The use of herbicides as a forest management tool was extensively reviewed as part of the Class Environmental Assessment (EA) for Timber Management (1994). This included a broad public hearing and consultation process. The assessment determined that herbicide use is an essential and acceptable practice and that the appropriate public safety and environmental controls are in place.

The application of herbicides is restricted to a very short application window dependent on growing season and daily weather conditions. Extensive public and First Nation consultation is conducted as per the requirements of the FMPM to ensure awareness of the scheduled areas for treatment. This starts with the identification of areas proposed for spray during the production of the FMP and associated information centers and public notices. As well, there is public notification at the annual work schedule stage, which entails newspaper advertisements, the first at least 30 days before scheduled date of spray commencement, and another advertisement at least 7 days before spray commencement. In addition, the MNR are responsible for a mail out notification to all people listed in the district mailing list for any Township with proposed spraying or any adjacent township within 1 km of spray location. All treatment blocks are posted no earlier than seven days prior to the commencement of spray operations with warning signs that meet the legislated requirements. The signs remain in place for a minimum of thirty days following the herbicide application.

In addition, NFRM also carries out additional measures to ensure safety of the public and other stakeholders (i.e. access security and pre-spray check flights to ensure blocks are clear).

The most recently approved herbicide labels are reviewed and will be followed as they pertain to buffer width calculations. Buffer widths will follow product labelling where there is no conflict with the approved forest management plan (FMP). The greater buffer width, whether FMP or product label, will apply around values.

All NFRM applicators and contractors, as well as supervisory staff involved in tending programs receive the training necessary to perform their specific tasks. Copies of required Applicator Licences, contractor, and supervisory staff training documents, and NFRM staff training records, are available.

All the proper licences, equipment and procedures are in place prior to initiating any herbicide project. NFRM's Health and Safety Policies and Procedures contain detailed instructions for the safe handling and storage of herbicides and related equipment.

5.0 Conclusion

Vegetation Management is an important tool to successfully carry out forest renewal after a harvest or natural disturbance. Third Party Certification, evolving Silviculture Guides, concerned public involvement, and a host of other factors are key elements in growing future forests for the People of Ontario. Only through timely "field" proven science, will we be able to move and meet these new challenges. We, as forest managers, have the privilege of working in the forest and must ensure that we operate in a respectful manner. This will prove to be our legacy.

NIPISSING FOREST RESOURCE MANAGEMENT INC.
DECISION MAKING PROCESS FOR THE JUDICIOUS USE OF HERBICIDES *ver. 2025*

Print on 11 x 17”

PLANNING STAGE
- Harvest areas allocated
- Area of Concern (AOC) planning occurs
- Silvicultural Ground Rules (SGRs) developed
- Desired Future Forest Condition

HARVESTING OCCURS
- According to present site conditions
- Using the most appropriate silvicultural system
- Guided by a forest operations prescription, which is developed through collected data
- Employing the best harvest method and equipment to meet management objectives

A.O.C. reserves, residual areas of clearcut patches.
- **Herbicide not applied**

Harvest areas in HDSEL, BY, and HDUS forest units where Desired Future Forest condition DOES NOT include red oak, planting of conifer (e.g. red spruce), or does not require beech control
- **Herbicide not applied**

DEPLETION MAPPING OCCURS
Harvest areas, A.O.C. reserves and modified zones, residual areas of clearcut patches are delineated in GIS.

Harvest areas likely to be within M.E.C.P buffer zones where tree planting will not occur.
- **Herbicide not applied**

Harvest areas that have sufficient advance desirable regeneration and don't require artificial regeneration.
- **Herbicide not applied (subject to future assessment prior to being declared Established)**

DETERMINING AREAS FOR ARTIFICIAL REGENERATION
- Using a variety of sources of information such as post-cut depletion mapping and data, aerial photography, AWS field verification surveys, other formal/informal surveys and local knowledge
- Guided by target % intensive renewal levels set in FMP for conifer dominated forest units
- Guided by FMP determined levels of PW/PR restoration
- Consideration given to: site productivity, current onsite post-cut vegetation, road access, adjacent values, future tending type that may be required, relative portion of treatable area, herbicide use buffer zones, herbicide use exclusion zones, tree species and stock size requirements

? If SITE PREPARATION chosen; Will 2-3 years of vegetation control be achieved with a mechanical method?

IF CHEMICAL SITE PREPARATION IS CHOSEN…WHAT TYPE?
1. Ground mechanical application (ABS) where: road access is good; operating terrain for a skidder is safe; target vegetation is < 3m tall; high number of AOC buffers within treatment area.
2. Aerial application where: road access is poor or has been removed; operating terrain too rough for safe operation of skidder; low ratio of AOC buffer zone area to treatable area.
3. Ground manual application where: beech is targeted for control (reduce beech bark disease presence and spread and to promote other tree species).

Areas not planted due to site conditions i.e.: rocky shallow soil sites, wet or flooded areas.
- **Herbicide not applied**

ARTIFICIAL REGENERATION OCCURS
NOTE: Prior to tree planting, consideration will be given for the method of future tending, if and when required.
Decisions can be made whether to plant up to or within likely M.E.C.P buffer zones

APPLICATION METHODS
1 & 2 Aerial or ground application – skidder chosen for the same reasons as above
3.Ground application- back-pack is chosen when selective or individual crop tree release will meet the vegetation management objectives. For example:
- releasing red oak or combined red oak / white pine
- releasing white pine in a clearcut conversion scenario where maintenance of nurse (shading) trees is an objective

DETERMINING HERBICIDE TYPE, APPLICATION RATE, APPLICATION METHOD
Level and type of competing vegetation is assessed: during tree planting; 1/2/5 yrs after tree planting in TSP's; at 2-7 yr. intervals through informal surveys in Pw shelterwood (for both artificial & natural regeneration); Establishment Survey #1 at 8-12yr post Regen Cut, Est. Survey #2 at 5-7yrs after clearcut and after Final Removal Cut.

? If TENDING is required, can vegetation mgmt. objectives be met using a manual or mechanical method?

If herbicide use is determined, then what application method will best fit all considerations?:
1. Aerial application - helicopter
2. Ground mechanical application – skidder (ABS)
3. Ground manual application – back-pack

Ground application methods provide for the highest degree of "precision targeting" of application - onsite flagging and/or GPS of treatment/exclusion boundaries

Sites determined to have tolerable levels of competing vegetation are excluded from treatment block
-**Herbicide not applied**

Sites where tending cannot operationally be completed (due to size, shape) are excluded from treatment block
-**Herbicide not applied**

Sites within MECP buffers are removed from treatment block -**Herbicide not directly applied**

Sites with lower competition levels will be identified and rates adjusted accordingly
-**Herbicide rate reduced**

Additional M.E.C.P buffers may be identified(i.e. as a result of previously unidentified values or new information). These sites are removed from treatment blocks.
-Herbicide not directly applied

First Nations, M.N.R. and M.E.C.P REVIEW
-Indigenous communities review areas in AWS to ensure their values are considered
-M.N.R. review/approve proposed aerial and ground application projects for rationale, herbicide type and application method, inventory of values to be protected, proposed buffer zones, and Project Plan
-M.E.C.P review aerial application project for buffer zones, use of licenced applicators/operators, and herbicide application rates

CHEMICAL TENDING OCCURS
-Application within specified treatment areas by experienced and licensed contractors
-Use of AGNAV is mandatory for aerial contractors
-Use of GPS/geo-referenced map is mandatory for ground application contractors

APPLICATION CONTROL
- Use of AGNAV and high-quality photos/maps ensure that only treatment areas receive a herbicide application, and that the herbicide is applied in an efficient manner throughout the block i.e., consistent coverage reduces need to re-retreat gaps
- Use of GPS created shapefiles of treatment/exclusion boundaries provided to skidder operators
-**Herbicide usage minimized**

POST TEND MONITORING
-Application sites inspected in June of the following year for: efficacy based upon percent coverage and control; crop tree damage; and off-target application
-Results used to: forecast future treatments; modify current application rates; identify trends/opportunities for refining optimal/minimal use strategies

Appendix 2. Silviculture Effectiveness In Planted Stands: Monitoring And Increased Tending Help Achieve Conifer Future Forest Units.

In February 2025, we analysed the results of regeneration surveys conducted from 2010 to 2024 (inclusively) to assess how well we were meeting silvicultural objectives in planted stands and how that might relate to the use of herbicide treatments.

Trees are typically planted between 1–4 years after harvest, depending on the prescription developed by the silviculture foresters. Planting is carried out to establish future conifer forests; without planting, most sites on the Nipissing Forest will regenerate as future hardwood forests. There are some exceptions: low-competition sites, with a good source of seed, or soil disturbance followed by a good seed crop and tending.

The process is as follows:

- Harvest blocks are visited by silviculture foresters the year after harvest after discussions with operation foresters and are surveyed using Avenza maps that include Supplemental Aerial Photography.
- Silvicultural prescriptions are developed based on site characteristics including soil type, soil depth, rockiness, topography, operability, access, competing species, come crops, etc.
- Sites that are suitable for planting are identified and the prescription includes site preparation treatments, target species composition, and planting densities
- Trees are ordered in the fall (e.g. fall 2025) and are usually sown in winter (e.g. 2026), grown during spring and summer (e.g. 2026), packed into boxes in the fall (e.g.2026), and stored in frozen storage over the winter (e.g. 2027). They are then thawed in time for spring planting (e.g. 2027).
- Most sites require one or two site preparation treatments before planting. Very few sites are planted immediately after harvest because trees are usually unavailable.

Each planting site is assigned a silvicultural ground rule (SGR) that describes the depletion forest unit (DEPFU, e.g. BW – white birch), the future forest unit (FFU, e.g. PR – red pine) and the silviculture intensity that will be used to achieve the future forest unit (e.g. I1 – intensive, level one). See table FMP-4 in the 2019-2029 Forest Management Plan for a list of approved SGR's.

The goal of planting is to achieve a conifer future forest unit, which includes PR, PWUS, PWST, MCL, or SF with less than 20% BF component. Although an SGR might describe BW-PR-I1, which implies that PR was planted and will be the FFU, other species may be planted, and the result might end up being a PWUS or an SF. These are all considered an achievement of the conifer forest unit objective. If the site becomes dominated by non-conifer species (e.g. BW or MR) and is not tended, the FFU will be a non-conifer species and will be considered a failure to meet objectives.

Regeneration surveys (either called free-to-grow (FTG) surveys or, more recently called establishment surveys) are performed 5-10 years after planting, after all tending treatments are done or when tending treatments are no longer able to improve the conifer species composition and/or site occupancy.

Results are summarized by 5-year periods starting 1995-1999. The years refer to the year of harvest or depletion year (DEPYR), not the year of planting. The results are specific to planted stands, they do not include natural regeneration.

The analysis included a total of 10,485 hectares planted on areas cut between 1995 and 2014 that were surveyed between 2010 and 2024.

Figure 1. The percentage of planted stands established in each of 4 time periods that resulted in conifer FFU (CONIFER_FFU) vs non-conifer FFU (NON-CONIFER_FFU). The numbers across the top of each bar shows the sample size in hectares.

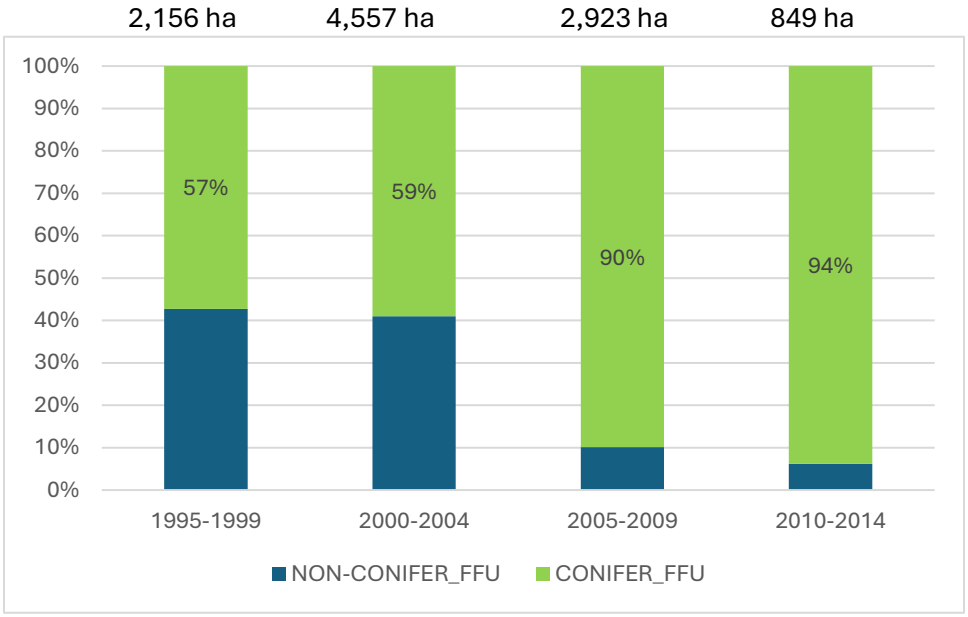

Figure 1 shows a clear increase in the percentage of planted areas resulting in conifer FFU over time. Over 90% of planted stands established in areas harvested after 2005 have met the conifer FFU compared to less than 60% before that time period.

Figure 2 The percentage of planted stands treated using herbicides in each of 4 time periods. The numbers across the top of each bar shows the sample size in hectares.

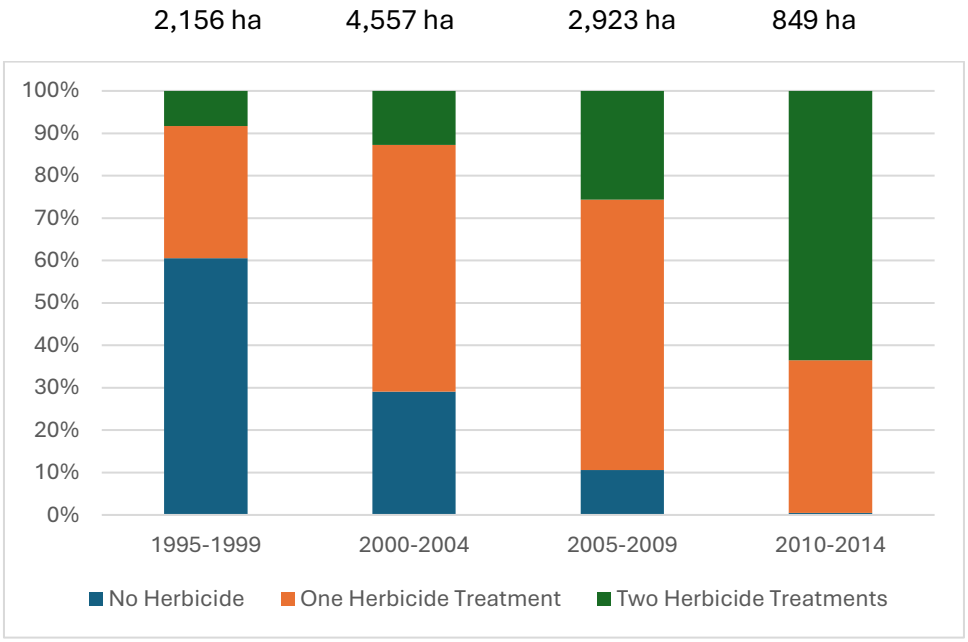

Figure 2 shows a trend of increased use of herbicide treatments starting in areas that harvested and planted after 2000. Poor results from surveys in areas harvested and planted during the 1995-1999 period indicated a need for more timely and more effective tending treatments. More formal methods for plantation monitoring (TSP program started in 2008) were implemented leading to more timely use of aerial and ground application of herbicides, and manual tending. Regeneration survey results are reflecting these changes and started to show better achievement of conifer future forest objectives in planted stands established in areas harvested after 2005.

Regeneration surveys are continuing, and the data will be re-analysed in 2027.