Nova Scotia's Forest Sustainability Regulations and Uneven-aged Forest Management: Conflicts and Opportunities

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STANDING TALL
FORESTS FOR LIFE

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The Standing Tall Campaign

The Ecology Action Centre's Standing Tall forestry campaign seeks to bring about a gradual and feasible shift from clearcutting to more uneven-aged and lower impact harvesting practices appropriate for maintaining and restoring the diverse values of the Acadian forest. The campaign also aims to heighten the public's awareness of the degradation of Nova Scotia's forests and to promote balanced and fair opportunities for public input into forest policy development.

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Executive Summary

Nova Scotia's Forest Sustainability Regulations were enacted under the provincial Forests Act in 2000. The regulations require forestry companies and others that acquire over 5,000m3 of wood annually from private lands to invest in silviculture either on their own operations or those of private woodlot owners, or through contributions to a government silviculture fund. The Department of Natural Resources (DNR) enacted the regulations to ensure that future wood supply would keep pace with expected increases in wood demand. The Department reviews the regulations every five years.

Silviculture that is applied under the regulations must adhere to a set of technical standards, but the regulations do not address harvesting practices that precede silviculture work, nor do they require that silviculture treatments be appropriate for site conditions or conserve non-timber elements of the forested landscape. To date, silviculture applied under the regulations has been overwhelmingly directed at even-aged management, part of the clearcutting model.

The rate of clearcutting in Nova Scotia - averaging over 520 km2 a year over the past decade - is widely viewed as excessive, and detrimental to most forest ecosystems in the province. Many forestry professionals, including some contractors and processors, are also concerned that the prevalence of even-aged forestry may be foreclosing opportunities to develop a vibrant value-added forestry sector in Nova Scotia, which would rely more heavily on trees managed through uneven-aged management approaches like selection harvesting.

In the spring of 2005, the Standing Tall Campaign of the Ecology Action Centre hosted a workshop with contractors, landowners, and processors who had experience applying or attempting to apply uneven-aged forest management under the Forest Sustainability Regulations. The first objective was to better understand how the participants viewed the regulations. The second objective was to identify how changes to the regulations could better support uneven-aged forest management, and, by extension, a healthier and more diverse forest ecosystem and forest economy in Nova Scotia.

Workshop participants typically held similar views on the philosophy and intent of the regulations, and had similar suggestions on how technical standards and the administration of silviculture funding could be improved to better facilitate the application of uneven-aged forestry approaches.

Key findings include:

Participants found that the regulations, despite their name, do not promote "forest sustainability". They attributed this to the intent of the regulations, which is simply to ensure wood supply. Participants believed that forestry in Nova Scotia was generally unsustainable given its impacts on forest ecosystems, and strongly supported improvements to provincial forest policies.

Participants believed that the Forest Sustainability Regulations greatly influenced forestry practices in Nova Scotia. Various challenges with applying the technical standards for uneven-aged treatments, combined with the lack of funding for such work, were thought to encourage

clearcutting at the expense of uneven-aged management, even in cases where the latter would be more silviculturally appropriate.

Participants drew on their experience working with the regulations to propose changes to the technical standards that would make the regulations easier to apply towards uneven-aged management. Many of the suggested changes, while important, are relatively minor. Participants were most interested in simply being able to apply the most appropriate silviculture treatments without being in conflict with the technical standards.

Suggested changes to the technical standards focussed on Category 7, which was designed for "forest quality improvement". In the opinion of many participants, this category does not appreciate the reality of doing silviculture in Nova Scotia's degraded forests. Specific proposed changes to the technical standards include:

- number of trees and minimum diameter requirements for crop tree release;
- allowing a greater variety of tree species to be released or pruned; and
- easing density and spacing requirements for selection management.

It was also proposed that the standards explicitly state that selection management credits can be applied to encourage the development of shade-tolerant species, regardless of a stand's present species composition.

Participants strongly believed that the level of funding for uneven-aged silviculture under the regulations is much too low, and that this has contributed to uneven-aged methods rarely being applied in the woods. They recommended that the per hectare rate of silviculture credits for Category 7 treatments be increased to reflect the true cost of their application. They also strongly recommended that DNR require a portion of all silviculture work done under the regulations, including all work funded by the Sustainable Forestry Fund, be dedicated to uneven-aged treatments. Over the past five years DNR has provided about $13.5 million in subsidies for silviculture on small private woodlots. Most of that money ends up being used on properties that have already been, or will be, clearcut.

This report has been submitted to the Department of Natural Resources for consideration during its five-year review of the regulations, occurring this year (2005).

Recommendations

1.1. Philosophy and purpose

1. The Forest Sustainability Regulations (FSRs) should place a higher priority on increasing the quality, not just the quantity, of Nova Scotia's wood supply.

2. Opportunities to make the FSRs more conducive to conserving non-timber forest values, in concert with wood supply objectives, should be identified and implemented.

3. The Province should recognize the ecological and economic benefits of uneven-aged and restoration forestry and do more to support landowners, contractors, and registered buyers who want to pursue these forest management approaches.

1.2. Technical standards

4. Technical standards for Category 7 should generally be broadened to make them more widely applicable, including in degraded stands.

5. The minimum number of commercial crop trees that must be released under Category 7a should be reduced from 125 per hectare, and credits provided for releasing trees should be proportional to the number of trees released.

6 The diameter requirement for Category 7a should be amended so that credit can be claimed for releasing well-established crop trees with diameters at breast height (dbhs) under 15 cm.

7. The list of species that qualify for crop tree release should be amended to include additional species that respond well to release, such as eastern hemlock.

8. The 5m pruning height requirement for Category 7b should be reviewed so that credit can be claimed for pruning young crop trees.

9. The list of species that qualify for crop tree pruning should be amended to include additional species for which pruning can create a more valuable product, such as red spruce and eastern hemlock.

10. To accurately reflect its purpose, the title of Category 7c should read "selection management <u>for</u> tolerant softwood, mixed wood, and hardwood stands".

11. The technical standard for Category 7c should state explicitly that credits can be claimed regardless of a site's existing species composition.

12. DNR should investigate the creation of a technical standard for Category 7c, designed to limit high-grading and damage to residuals.

13. The technical standards for Category 7c should allow a post-treatment basal area greater than $26m^2$/ha, where achieving the current standard would require too heavy a treatment.

14. The minimum crop tree stocking requirement for Category 7c should either be decreased, or credit be made available for underplanting tolerant species to bring stocking up to the standard.

15. The minimum spacing requirement for Category 7c should be reduced.

16. The Forest Sustainability Regulations should be amended to ensure that the technical standards required for any silviculture work funded through the Sustainable Forestry Fund do not differ from those described in the regulations.

1.3. Administration and funding

17. DNR should re-evaluate the amount of credits provided per hectare of Category 7 silviculture work, and increase that amount to a level that consistently covers the real cost of conducting those treatments.

18. The number of credits that can be initially claimed for Category 7 work should be increased to recognize that the cost of the initial entry typically exceeds that of subsequent entries.

19. All contributions to the Sustainable Forestry Fund should be dedicated to Category 7 treatments.

20. DNR should require registered buyers to allocate a minimum portion of their required silviculture work to Category 7 treatments.

21. DNR should explore a formal partnership with the Nova Scotia Woodlot Owners and Operators Association, to administer Category 7 funding from the Sustainable Forestry Fund.

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1. Background

In 2000 the Nova Scotia Department of Natural Resources (DNR) implemented a set of "Forest Sustainability Regulations" under the *Forests Act* in response to concerns that Nova Scotia was facing a wood shortage due to increasing demand from mills in the province. The Department's website cites a 1999 wood supply forecast (DNR 1999) that found that silviculture investments, particularly on small private woodlots, were not keeping pace with harvest levels. The intent of the regulations is to track the volume of annual wood harvests and require matching silviculture to ensure adequate wood supply.

The Forest Sustainability Regulations (FSRs) require "registered buyers" – forestry companies, businesses, and individuals acquiring over 5,000m^3 of wood annually from private lands – to invest in silviculture in proportion to the amount of wood they acquire. Within the first two months of each year, every buyer must submit a Wood Acquisition Plan to DNR.

The plan must include an estimate of the wood volume that the buyer intends to acquire in the upcoming year. That estimate is fed into a formula established in the regulations to calculate the number of silviculture credits that the buyer is obligated to redeem. The more wood a buyer obtains, the more silviculture credits they accumulate, and the greater their obligation to offset credits. Over the next year, the buyer must redeem all of their credits through either an in-house silviculture program or a monetary contribution to a government-established silviculture fund (called the "Sustainable Forestry Fund"), or a mixture of both. A credit schedule prepared by DNR specifies how various silviculture activities on the ground translate into credits toward meeting a registered buyer's obligation (Table 1).

Monies contributed to the Sustainable Forestry Fund in lieu of an in-house silviculture program are directed to the Association for Sustainable Forestry (ASF). ASF, which was created by the Province, reinvests money from the Fund, as well as supplemental funding from DNR, into silviculture work on small private woodlots. Landowners and forestry contractors can apply to ASF for silviculture funding. The vast majority of silviculture done under the regulations, however, is through the registered buyers' own programs.

To ensure that silviculture investments under the regulations are effective in promoting tree growth, the regulations include a set of technical standards (Appendix 1). The standards prescribe conditions such as the range of stocking, species composition, and other measures of stand condition that must be satisfied.

The technical standards are divided into seven broad categories that differ depending on regeneration method (i.e., natural regeneration, plantation, or selection management), and for even-aged stands, the phase of stand development. Categories 1 through 6 support even-aged methods, while Category 7 purports to support all-aged or "uneven-aged" treatments. Table 1 provides a description and credit level for each category.

Category	Description	credits provided per hectare
1	Natural Regeneration Establishment a) regeneration and fill plant < 500 trees/ha b) regeneration and fill plant ≥ 500 trees/ha	 50 300
2	Plantation Establishment	650
3	Early Competition Control	300
4	Density Control and Release in Plantations	500
5	Density Control and Release in Natural Stands	750
6	Commercial Thinning	400
7	Forest Quality Improvement: a) Crop Tree Release b) Crop Tree Pruning c) Selection Management	 300 300 300

Table 1. Category descriptions and silviculture credit schedule

Since the inception of the FSRs, nearly all silviculture activities in Nova Scotia have been directed to even-aged treatments like natural regeneration and plantation establishment, thinning, and density control (Figure 1). In 2003, the last year for which statistics are available, 31,251 hectares were treated with even-aged silviculture. Uneven-aged treatments accounted for just 603 hectares (DNR 2004), less than 2% of the total area.

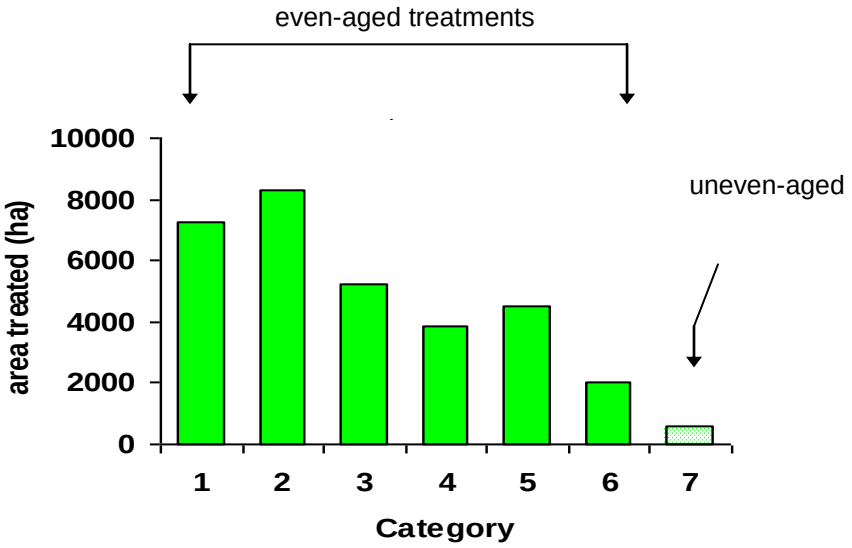

Figure 1. Breakdown of silviculture treatments in Nova Scotia by area for 2003. *source:* DNR (2004)

Even-aged forestry in Nova Scotia is typically a variation of clearcutting followed by plantation or natural regeneration, competition control (which can include spraying) and/or thinning, and eventually clearcutting again. Various contractors, scientists, conservation advocates, and the Nova Scotia Woodlot Owners and Operators Association have expressed unease with what appears to be a fixation with even-aged forestry in Nova Scotia, far beyond what seems ecologically justifiable or economically wise.

Some mills that process hardwood sawlogs have echoed their concerns. The even-aged approach to forest management is applied far in excess of what natural disturbance regimes for most of Nova Scotia's forests would warrant. A paper prepared by the Nova Scotia Department of Natural Resources estimates that 23% to 58% of the province's forested land base is regenerated by natural disturbances best mimicked by uneven-aged management (Neily et al. 2004 (draft)). Other research suggests the figure is probably even higher (e.g., Seymour et al. 2002).

Even-aged vs. uneven-aged forest management

Conventional silviculture systems can be broken down into two approaches, "even-aged" and "uneven-aged".

Even-aged management produces or maintains stands in which there are one or two age classes present. Clearcutting followed by natural regeneration or plantation establishment is a typical even-aged management approach in Nova Scotia. Seed tree and shelterwood cuts are also even-aged prescriptions.

Uneven-aged management produces or maintains stands that contain three or more age classes. They are typically harvested and regenerated by selection and removal of single trees or small groups of trees.

It is presumed that the even-aged model benefits buyers who acquire pulpwood and general construction lumber. However, its widespread application does not necessarily bode well for the long-term economic vitality of the province's forestry industry (Pannozzo and O'Brien 2001, Wilson and Colman 2001). For example, the much-touted "value-added" sector in Nova Scotia – businesses making wood products that are more valuable than paper or lumber – seems to be lagging behind other provinces with comparable forest types. In 1997/98 Nova Scotia's timber receipts averaged $\$82/m^3$ of wood processed, compared to $\$273/m^3$ for Ontario and $\$122/m^3$ for New Brunswick (Pannozzo and O'Brien 2001). While softwood fibre can grow quickly with even-aged treatments, the species associated with value-added products tend to be present in forest stands with lots of shade. Retaining the right growing conditions to optimize the health, vigour, and value of each tree requires uneven-aged regeneration and tending methods.

Since forests here have been managed primarily under even-aged systems for over thirty years, the Nova Scotia woods have undergone a dramatic shift in species composition. The abundance of valuable late-successional species such as yellow birch, sugar maple, and red spruce has declined, while open-grown species like white birch, red maple, poplar, and white spruce are more common (Loo and Ives 2003). Uneven-aged forestry treatments like selection harvesting can help the province retain its shrinking shade tolerant stands and bring them back to their historic geographic range.

Finally, two opinion surveys in Nova Scotia over the past decade (Sanderson et al. 1999, Sanderson et al. 2000a) suggest that the public views the rate of clearcutting, the most prolific even-aged forestry prescription, as excessive, and the practice is generally frowned upon (Figure 2). This aversion to clearcutting apparently extends to many private woodlot owners as well. In another survey, funded by the Nova Forest Alliance, Sanderson et al. (2000b) found that small private landowners in central Nova Scotia, as a group, had "strong reservations" (p. vi) about the practice.

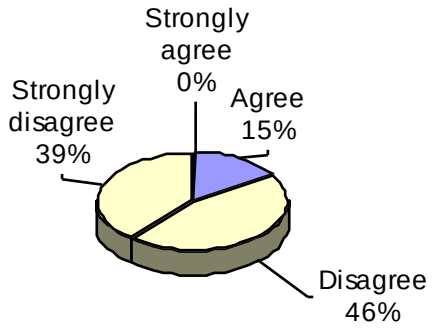

Figure 2. Level of agreement with the statement "Clearcutting should be used as a harvesting method in Central Nova Scotia" among 706 respondents in a 1999 public opinion survey in central Nova Scotia (Sanderson et al. 1999).

Thus there seems to be a genuine desire from both landowners and the broader public to see alternatives to clearcutting. The rejection of widespread clearcutting and desire for alternatives has been echoed during public debates on wildlife habitat regulations (Smith 1999), Integrated Resource Management, proposed Wilderness Areas, and the Province's Game Sanctuary review. In all of these cases, there was substantial public interest in better forest conservation.

Against this backdrop, there is a strong case that a substantial shift from even-aged to uneven-aged forestry is overdue in Nova Scotia – to restore native forest types, to diversify and strengthen economic opportunities associated with wood processing, and to respond to public and landowner aspirations for a shift away from clearcutting.

The *Forests Act* requires a review of the Forest Sustainability Regulations (FSRs) every five years. As the regulations were implemented in 2000, a review is slated for 2005. In preparation for this review the Ecology Action Centre's Standing Tall forestry campaign invited registered buyers, contractors and landowners who were familiar with the FSRs to a one-day workshop to discuss their experiences in using or attempting to use the regulations to support uneven-aged management.

This report summarizes those discussions. We have provided a list of recommendations generated from the workshop. If implemented, the new FSRs can ease and accelerate the transition to more genuinely sustainable forestry in the province.

2. Methods

The Ecology Action Centre identified people interested in uneven-aged forestry by canvassing the provincial Hardwood Working Group, approaching Department of Natural Resources staff, and sending notices through various listserves. Some participants were known to us because they had previously approached the Centre about forest management issues.

Participants were sent a questionnaire on the Forest Sustainability Regulations (see Appendix 2) prior to the workshop, and asked to respond prior to the workshop. The questionnaire queried participants about their experiences using the FSRs, especially in relation to how effectively they supported "ecologically sustainable forest management practices". Organizers of the workshop used the responses to focus the workshop discussions.

The workshop took place at the Nova Forest Alliance offices in Stewiacke, Nova Scotia, on March 10, 2005. It started with a presentation that reviewed the FSRs and responses to the questionnaires. After that, two working group sessions of about an hour and a half each followed. The morning session focussed on "identifying concerns", the afternoon session on "identifying solutions". There were two separate working groups of six to eight individuals in each session. At the end of each session, each group orally reported their findings to all participants. Each working group session had a facilitator and note taker, and deliberations were also captured on audiotapes to help ensure accurate reporting. Prior to adjourning the workshop, a roundtable discussion allowed an open conversation on the FSRs among all participants.

A handful of individuals who wanted to attend the workshop but were unable to were interviewed by telephone afterwards.

3. Results and Discussion

Topics raised in the questionnaire, the workshop, and in follow-up interviews can be split into three topic areas:

- purpose of and philosophy behind the regulations,
- technical standards, and
- administration and funding.

3.1. Purpose and Philosophy

The FSRs were created to "sustain the productivity of Nova Scotia's forests in order to continue providing for future timber required by the Nova Scotia forest industry" (DNR 2000). The intent is to grow enough wood to satisfy industry demand, rather than to sustain a broad range of forest values. While workshop participants recognized the value of a secure wood supply, many expressed frustration that the regulations' focus on wood supply seems to trump the conservation of ecological and other non-timber forest values.

The regulations, they claim, divorce the goal of growing wood from the goal of conserving the full range of forest values. This is inconsistent with the holistic or integrated approach to forest management that many landowners and some contractors prefer to practice, and that the province's own Code of Forest Practice purports to espouse. Participants generally believed that by not acknowledging the need to sustain ecological values, the regulations would invariably compromise them, even if that were not their intent. If the regulations were designed solely to sustain timber supply, many stated they should be called something other than "Forest Sustainability Regulations", which implies "sustaining the forest".

Two broad options were proposed to remedy the perceived deficiency: (i) overhaul the technical standards to include ecological criteria, making them *bona fide* "sustainability regulations", or (ii) introduce other policies and regulations to make forest management in the province genuinely sustainable. Participants agreed that Nova Scotia's existing forest policies and regulations (e.g., Wildlife Habitat and Watercourses Protection Regulations) only address a small subset of forest sustainability issues, and do a poor job of sustaining the full range of forest values, including ecological values. For example, without a parallel set of regulations to ensure that harvesting methods are appropriate for site conditions, the FSRs were thought to encourage clearcutting where it should not occur. A DNR manager pointed out that the FSRs might not be the most effective vehicle for addressing non-timber values, and rewriting them to meet new objectives could take years.

After some discussion, it was generally recognized that promoting good all-around forestry in Nova Scotia requires a much more comprehensive reworking of forest policy and management. Nonetheless, participants embraced the notion that the regulations should still be scrutinized to find opportunities for promoting "real" sustainability in concert with wood supply objectives.

Many people noted that, with careful management, forests that provide ongoing ecological benefits can also produce high volumes of wood for harvesting.

Participants were equally concerned about the FSR's apparent preference for promoting wood *quantity* over wood *quality*. They pointed to the lopsided application of silviculture credits towards the even-aged categories. Many wondered if this focus on quantity was further accelerating the transition of forestry in Nova Scotia to a "high volume/low quality" model and reducing opportunities to develop a more sustainable and lucrative sawlog industry. It was widely thought that growing and harvesting lots of small- diameter wood for pulp and lumber generates less income for Nova Scotia than managing for smaller quantities of more valuable sawlogs.

Certainly, the uneven-aged treatments that many of the participants practice, and want to see more of in Nova Scotia, seem poorly supported by the regulations and the silviculture credits system set up to fund it. Nearly all the participants stated strongly that the regulations should be improved to better support the *economic* goal of restoring or sustaining stands with late-successional species that could provide Nova Scotia processors with a reliable supply of high-quality sawtimber over the long term.

Some participants took issue with the premise that wood supply can be sustained without simultaneously paying attention to ecological values. For example, it was noted that the simplified structure and species composition of conifer plantations can make them more susceptible to large timber losses from natural disturbances like wind and forest pathogens.

While the people who attended the workshop were pleased that the FSRs at least acknowledged a role for uneven-aged prescriptions (i.e., Category 7), they strongly believed its actual applicability lagged far behind its potential. As previously noted, Category 7 treatments accounted for less than 2% of the area claimed for silviculture credits in 2003. Yet, participants were confident that a much larger demand for uneven-aged treatments exists.

A contractor and a representative of the Nova Scotia Woodlot Owners and Operators Association believed that many so-called "non-participating" landowners – those who choose not to allow harvesting on their property – sit out because they disdain the forest degradation they associate with clearcutting. They cautioned government and industry not to underestimate the number of landowners who yearn for uneven-aged and restorative forestry – but either cannot afford the work or cannot find a reputable and skilled contractor to do the work. A portion of potential wood supply, they concluded, remains tied up because alternatives to clearcutting are not widely available in Nova Scotia.

A number of participants also shared their belief that while some landowners sit out, others who allow even-aged prescriptions on their property do so reluctantly. These are people who would opt for selection harvesting if it were better supported and promoted.

Two key barriers in the Forest Sustainability Regulations to more widespread application of uneven-aged silviculture on small private woodlots were identified:

- difficulties in achieving technical standards, and
- difficulties with administration and funding for Category 7 work.

These two issues are explored further in the next sections.

Recommendations: Purpose and Philosophy

1. The Forest Sustainability Regulations (FSRs) should place a higher priority on increasing the quality, not just the quantity, of Nova Scotia's wood supply.
2. Opportunities to make the FSRs more conducive to conserving non-timber forest values in concert with wood supply objectives should be identified and implemented.
3. The Province should recognize the ecological and economic benefits of uneven-aged and restoration forestry and do more to support landowners, contractors, and registered buyers who want to pursue these forest management approaches.
4. Technical standards for Category 7 should generally be broadened to make them more widely applicable, especially in degraded stands.

3.2. Technical Standards

The participants in the workshop had up to five years of experience working with the regulations. Most of their experience, and a focus of this workshop, was in applying Category 7 credits. Category 7 is named "forest quality improvement" and contains three subcategories (See Appendix 1 for complete descriptions):

- 7(a) crop tree release
- 7(b) crop tree pruning
- 7(c) selection management in tolerant softwood, mixed wood or hardwood stands

Based mostly on their personal experiences, participants aired a number of concerns about the technical standards and offered ways they could be improved.

Category 7a – Crop Tree Release

Crop tree release refers to the removal of trees on one or more sides of a crop tree, so that its crown has room to expand. Crop tree release is typically pursued to accelerate bole growth (Perkey et al. 1994).

Most of the workshop participants had either applied Category 7a credits or had attempted to apply them. While participants supported the concept of incorporating crop tree release in the FSRs, many thought the standards were too prescriptive or rigorous to be broadly applicable in the woods.

Some participants claimed that the average diameter requirement is too high – that is, many vigorous and well-formed crop trees that are already well into advanced stages of regeneration do not qualify to be released because their diameter at breast height (dbh) does not exceed 15cm. It was suggested that a height threshold be used instead, so contractors could get credit for

releasing more younger trees with good growth potential. One forester proposed 5m as an appropriate height.

There was extensive discussion about needing to release at least 125 crop trees to qualify for credits, and then more discussion about whether a single minimum number was a good approach for encouraging Category 7a work. Having to release a minimum of 125 trees per hectare was problematic for some participants. They noted that it is not uncommon for fewer than 125 acceptable crop trees to be growing in a hectare of degraded forest. Crop tree release will often be the most appropriate way to build up the volume and value of such stands, they reasoned, and as such, credit should still be given even if there are not quite enough trees. Too many stands that could benefit from trees being released currently fail to qualify for Category 7a work.

Highlights of the technical standards for Category 7a - Crop tree release:

- minimum of 125 crop trees released per hectare
- average dbh of released crop trees must be at least 15cm
- acceptable species of crop trees: sugar maple, yellow birch, white ash, red oak, eastern white pine, red pine, white birch, and red spruce
- crop trees must be released on at least three sides
- silviculture credit cannot be claimed for the same site more than once every ten years

At the other end of the spectrum, however, contractors also said that sometimes they work on properties where it makes sense to release well in excess of 125 trees per hectare, sometimes 400 or more. But releasing 125 earns just as many credits as releasing 200, 300, or 400, so there is little incentive to do more work to release the additional trees that need it. Some participants said that the number of credits provided for Category 7a should be made proportional to the number of trees treated. Doing so would encourage contractors to release all the trees in a stand that could benefit from it, rather than tempting them to quit somewhere slightly over 125. Presumably, this would also provide a subsequent silvicultural benefit to the province (i.e., more wood growing faster). One contractor recommended that an additional 100 credits be provided for each additional 100 crop trees released.

Finally, a number of participants believe that the list of species that qualify for crop tree release is too short. The omission of eastern hemlock in particular confounded some participants. This species is known for responding well to release (Perkey et al. 1994), is commercially sought for flooring and post & beam construction, and is under-represented in Nova Scotia compared to its historic abundance (Loo and Ives 2003).

Recommendations: Category 7a – Crop Tree Release

5. The minimum number of commercial crop trees that must be released under Category 7a should be reduced from 125 per hectare, and credits provided for releasing trees should be made proportional to the number of trees released.

6. The diameter requirement for Category 7a should be amended so that credit can be claimed for releasing well-established crop trees with diameters at breast height (dbhs) under 15 cm.

7. The list of species that qualify for crop tree release should be amended to include additional species that respond well to release, such as eastern hemlock.

Category 7b – Crop Tree Pruning

Crop tree pruning is applied to young trees to promote the growth of clear lumber, which is more valuable than knotty wood.

Highlights of the technical standards for Category 7b - Crop tree pruning:

- minimum of 125 crop trees pruned per hectare
- pruned height of crop tree must be at least 5m
- average height of crop trees must be at least 8m
- acceptable species of crop trees: sugar maple, yellow birch, white ash, red oak, eastern white pine, red pine, and white birch

As with the minimum requirements for crop tree release, a number of participants said that criteria for pruning are too restrictive. Some participants stated that requiring pruning to extend for 5m up a stem would cause young trees that are good candidates for pruning to be overlooked. Trees that are not pruned until they are older will possess less clear lumber at maturity than those in which pruning had started earlier. It was pointed out that contractors generally find it easier and faster to prune younger forests.

Workshop participants proposed two ways to improve the current standard: (i) reduce the minimum height requirement, and (ii) introduce a required minimum "live crown ratio" instead of a minimum height. Live crown ratio refers to the height of the stem with live branches relative to the total stem height. Because pruning reduces the surface area of leaves or needles available to facilitate photosynthesis, pruning that is too aggressive can retard tree growth.

As with Category 7a, the list of acceptable species for Category 7b treatments was seen as too restrictive. The acceptable crop tree pruning species are the same as those listed for crop tree release, with the exception of red spruce. Some participants believe that it was a mistake to leave red spruce and hemlock off the list for pruning. They claim that under certain market conditions sawlogs from these species can fetch a higher price when they have clear boles.

Recommendations: Category 7b: Crop Tree Pruning

8. The 5m pruning height requirement for Category 7b should be reviewed so that credit can be claimed for pruning young crop trees.

9. The list of species that qualify for crop tree pruning should be amended to include additional species for which pruning can create a more valuable product, such as red spruce and eastern hemlock.

Category 7c – Selection Management

Selection management typically refers to the removal of single trees or small groups of trees to promote the regeneration of shade tolerant tree species. In selection management, openings

created by harvesting are small enough to remain shaded during most of the day, such that shade tolerant species are favoured in regeneration (McEvoy 2000).

In conventional selection management, a balanced age-class distribution is sought so that a constant supply of mature timber is available on a periodic basis. Selection management is more difficult and costly than even-aged treatments like clearcutting.

It requires more thought and planning (e.g., tree marking), frequent stand entries, and greater care in felling and skidding, both for the safety of loggers and to protect trees that are left behind.

The title of Category 7c – "Selection management in tolerant softwood, mixed wood, or hardwood stands" (emphasis added) – has caused confusion among some landowners. The title can be (and has been) interpreted to mean that only stands that are already dominated by shade-tolerant species qualify.

At least one landowner and a contractor who attended the workshop saw this as problematic, as they were interested in using Category 7c credits to transition existing stands dominated by intolerant species towards more valuable tolerant species. Another contractor shared in an interview a situation where he had to inform a client that retaining a partial overstory of poplar to help shade white pine seedlings was not permitted by the regulations either. Others in the workshop concurred that Nova Scotia has an abundance of stands dominated by intolerants that would benefit from a gradual transition to longer-lived tolerant species.

Highlights of the technical standards for Category 7c – Selection management in tolerant softwood, mixed wood, or hardwood stands:

- post-treatment basal area of crop trees must fall between 15 m^2/ha and 26 m^2/ha
- minimum of three height classes per site
- minimum of 3m difference in average height between height classes, except for regeneration classes which require a minimum difference of 2m
- stocking must be at least 80% at 2.4m x 2.4m spacing or equivalent
- minimum acceptable spacing for softwoods with heights between 2m and 6m is 1.8m
- minimum acceptable spacing for hardwoods between 6m and 9m is 1.8m
- silviculture credit cannot be claimed for the same site more than once every ten years

According to Jorg Beyeler, the Director of DNR's Forestry Division, Category 7c credits are not intended to be limited to stands dominated by tolerant species. Applying credits to re-establish shade-tolerants where they are currently not abundant, he explained at the workshop, is consistent with the intent of the regulations. It was therefore suggested that for greater clarity the title of Category 7c be renamed "Selection management for tolerant softwood, mixed wood, or hardwood stands", and that the regulations explicitly acknowledge that this category can apply where a management objective is to establish tolerant stands regardless of present species composition.

A basic tenet of selection management is to promote the growth of high quality sawlogs. Managing for valuable sawtimber entails minimizing residual damage (e.g., scarring) during harvesting and avoiding high grading ("taking the best, leaving the rest"). Currently the FSRs do not address quality, and the choice of which trees to invest in. There is no assurance that trees counted as "crop trees" actually have good potential to accrue in volume and value. It was suggested that revised regulations include a measurable indicator to assess tree quality and ensure that acceptable growing stock remains in stands following entries.

Most of the concerns about Category 7c were reserved for the current technical standards. Many participants thought that the standards are too rigorous to be widely applicable for uneven-aged stands, especially in the Nova Scotia context. One contractor remarked that the requirements for basal area, stocking, and spacing do not appear to be designed with uneven-aged stands in mind – rather they resemble a "cut and paste" of even-aged standards.

For example, two contractors said that the residual basal area ceiling for selection management of $26m^2$/ha is too inflexible, in that it does not recognize the desirability of gradual treatments for overstocked stands, or instances where landowners are promoting crowded stands to produce tightly grained wood. Each of the contractors told of woodlots they were familiar with that had stands with basal areas in excess $50m^2$/ha. They claimed that reducing these to $26m^2$/ha in a single entry would allow too much light in to promote late-successional species, place the stand at risk of windthrow (especially in red spruce stands), and possibly require the removal of trees that have not reached their maximum value.

In short, the regulations could require too heavy a treatment. Those contractors proposed that the maximum post-treatment basal area for stands managed under Category 7c be increased where pre-treatment stocking is very high, or management objectives justify overstocked stands.

Several contractors who participated in the workshop or follow-up interviews identified the Category 7c stocking requirement as unnecessarily onerous. The regulations require a minimum crop tree stocking of "80% at 2.4m x 2.4m or equivalent" spacing. This standard was viewed as doable under "ideal" uneven-aged conditions, but difficult to achieve for degraded stands, of which there are many in the province.

Contractors claim they often do not have the luxury of being able to establish optimum stocking in the short-term. They also commented that Category 7c sites require the same level of stocking as sites funded under Categories 1 and 5, "Natural Regeneration Establishment" and "Density Control and Release in Natural Stands". Category 1 and 5 sites are typically old cutovers resulting from even-aged prescriptions. One would expect more prolific regeneration under these open conditions than in Category 7 sites where regeneration occurs below an overstory. Furthermore, low stocking in cutovers can be rectified by fill-planting funded under Category 1 – but no funding exists for comparable planting under Category 7.

Some contractors noted they could meet the stocking standard if the FSRs for Category 7 were broadened to fund underplanting of tolerant species where uneven-aged sites exhibited poor regeneration. Underplanting in such areas, they suggested, would be a way to promote future timber growth of valuable species while contributing to ecological and restoration objectives.

Some participants also questioned the minimum spacing requirement of 1.8m for young crop trees in uneven-aged stands, and recommended that it be reduced or eliminated. They pointed out that the existing spatial distribution of crop trees in stands that are otherwise good candidates for Category 7c silviculture work is sometimes not ideal – there are natural aggregations of crop trees in some places, and more dispersed distribution elsewhere. This natural variation does not lend itself well to strict spacing criteria. One contractor said that thick regeneration (i.e., tight spacing) can help protect future crop trees without retarding tree growth.

Recommendations: Category 7c – Selection Management

10. To accurately reflect its purpose, the title of Category 7c should read "selection management for tolerant softwood, mixed wood, and hardwood stands".
11. The technical standard for Category 7c should state explicitly that credits can be claimed regardless of a site's existing species composition.
12. DNR should investigate the creation of a technical standard for Category 7c designed to limit high-grading and damage to residuals.
13. The technical standards for Category 7c should allow a post-treatment basal area greater than 26m2/ha where achieving the current standard would require too heavy a treatment.
14. The minimum crop tree stocking requirement for Category 7c should either be decreased, or credit be made available for underplanting tolerant species to bring stocking up to the standard.
15. The minimum spacing requirement for Category 7c should be reduced.

3.3. Harmonization

Even though DNR has prepared a set of technical standards, these standards are not always "the final word". Contractors and foresters told of instances where either the mill they were working with or the Association for Sustainable Forestry (ASF) required site conditions above and beyond requirements of the regulations, making already narrow criteria even narrower.

In one example, the ASF rejected a funding application from a contractor who proposed 100ha of Category 7c work in Kings County because they felt the species composition there wasn't well suited to selection management. But the technical standards do not dictate what species must be present. In this case, the contractor believed that a selection harvest could promote the regeneration of late-successional species by creating small gaps in a white spruce overstory, consistent with the intent of Category 7c.

He was not alone in finding the multiple layers of standards confusing, unnecessary, and unfair. Most participants agreed that a single set of technical standards established by DNR in the regulations should apply across the board.

Recommendation: Harmonization

16. The Forest Sustainability Regulations should be amended to ensure that the technical standards required for any silviculture work funded through the Sustainable Forestry Fund do not differ from those described in the regulations.

3.4. Administration and Funding

Participants hoped that some of the difficulties they have experienced in applying or attempting to apply credits for uneven-aged management work will be resolved during the 5-year review of the regulations. Most comments aired at the workshop and in interviews spoke to the regulations' limited financial and administrative support for uneven-aged treatments. Participants stated that uneven-aged silviculture should be better assisted – both to build a value-added processing industry for Nova Scotia and to help restore the structural and species diversity of the province's forests.

Most participants attributed the limited interest in uneven-aged management to what they saw as a disproportionate amount of influence by the registered buyers in directing what treatments get funded - a belief that the mills "call all the shots". But depending on the arrangement between the mills and their wood suppliers, some workshop participants claim they are paying a third of the cost for silviculture work done on small private woodlots, while the rest is shared between the mill that acquires their wood and the Crown (the government pays roughly one third of the cost of silviculture activities on private woodlots).

Although the combined funding contribution from the Crown and landowners may be substantial in these cases, a widespread perception persists among landowners and the public that the mills pay most, if not all, silviculture expenditures. Irrespective of other administrative issues (e.g., availability of funds), participants agreed that this was an undesirable perception, and that steps should be taken to explicitly recognize the contributions coming from the public purse and landowners. One suggestion was to promote silviculture funding under the regulations as a "partnership between the provincial government, the industry, and woodland owners". Listing the contributions of the three parties on mills slips was also suggested.

Regarding the funding rate for Category 7 work, nearly all the participants agreed that the 300 credits per hectare available for Category 7 work was too low. It was pointed out that while the number of credits prescribed by DNR does not automatically translate into dollars for work done (which can be negotiated), the credit rate nonetheless represents a starting point for mills to determine how much they will actually pay someone to complete silviculture work.

The ASF, which allocates silviculture funding from the Sustainable Forestry Fund as well as additional DNR silviculture funding, pays contractors dollar amounts equal to credit amounts. In the case of Category 7 work, that means contractors receive $300 per hectare. Some participants who had received Category 7 funding reported that they barely broke even. It was generally agreed that widespread application of Category 7 treatments is highly unlikely unless the rates increase.

It was also noted that the current silviculture rates make uneven-aged management financially less attractive than even-aged treatments (By comparison, monies available for even-aged treatments (Categories 1 through 6) range from $300/ha to $750/ha). This confounded some participants, who noted that there was much more planning and labour involved in doing selection management than, for example, commercial thinning, for which $400/ha can be claimed.

One contractor explained that the current rates can make it more profitable to convert a property dominated by tolerant species into a plantation than to use silviculturally appropriate selection methods that would increase the volume and value of timber on the site.

An incentive to clearcut?

A Nova Scotia woods contractor shared this story…

I looked into getting funding under Category 7c to work a three hectare site near Tatamagouche. This site was transitioning to uneven-aged structure, and had a species mix that included red spruce, hemlock, sugar maple, yellow birch, and red maple. The harvest I did was designed to encourage these stand conditions.

This job – had it been funded – would have qualified for $900 under Category 7c every ten years, or $1,800 combined for the first and second entries. But if I had chosen to clearcut this natural forest and convert it to a conifer plantation, the Forest Sustainability Regulations would have rewarded my decision by providing a windfall of $3,450 over the same period - $1,950 for the initial plantation establishment and another $1,500 later for density control – this just to begin the process of returning the stand to volumes already on site.

Doing the math, clearcutting and creating a plantation that may or may not produce desired stand conditions is $1,650 more lucrative than working with the site to grow more valuable timber and maintain stand structure. This is a lot of money for a private woodlot owner trying to decide what to do with their woodlot. The regulations make a decision to clearcut yield more money than acting responsibly.

Participants recommended that DNR review and increase the credits provided for Category 7 work so that it reflects the true cost of selection management, and can be a financially feasible alternative to even-aged treatments. Suggestions for an appropriate rate ranged from $400/ha to "at least $450 to $500".

A registered buyer from Pictou County pointed out that although Category 7 credits can be applied to a given site every ten years, the rate for at least the initial entry should be increased. He reasoned that costs to the contractor are much higher during the initial entry than for

subsequent entries. This is due to higher upfront costs for things like building skid trails and timber cruising.

Simultaneously, the income for contractors and landowners is often less during the initial entry because stocking or timber quality has not been improved yet – a lot of low-grade product must be removed to create growing space for more valuable trees. The benefits of Category 7 work typically show up years later, even though many landowners want to see some revenue right away, he explained. Making the initial entry more lucrative could broaden the pool of contractors able to afford Category 7 work, and allow landowners to increase the long-term value of their woodlands through forest quality improvement work or "tending".

An equally pressing issue to the participants was the overall lack of opportunity that the regulations provided to pursue uneven-aged work. As it stands now, accessing funding to pay for Category 7 treatments is difficult, if not impossible, for many contractors - either the mills are not interested or the ASF is not interested. Most participants were under the impression that ASF was set up to fund treatments on small private woodlots that industry would not.

ASF received $102,209 in 2003, and $139,542 in 2004 from the Sustainable Forestry Fund to support silviculture on small private woodlots (DNR 2004, DNR 2005). While these are fairly modest sums, the association has also received $2.18 million in supplemental silviculture funding from DNR between 2001 and 2004 (DNR 2002, DNR 2003, DNR 2004, DNR 2005). This $2.18 million is over and above the $11.3 million paid to Registered Buyers between 2000-2004 by the provincial government towards private woodlot silviculture. Two contractors who had applied to ASF for funding to do restoration treatments were turned down, while two consultants did receive selection management funding.

Through the workshop and interviews, people expressed frustration that although the Province claims to support value-added processing, it nonetheless does not require that a portion of its funding share be allocated to uneven-aged management. Participants wondered why the provincial government does not use that funding leverage to encourage selection harvesting and restoration treatments that would help build the province's value-added sector.

There was unanimous support for the Crown allocating a sizeable percentage (some said all) of its silviculture funding to Category 7 work to help correct the current imbalance between even-aged and uneven-aged management. After all, the logic went, the Province views both approaches as legitimate, but only one (even-aged) is widespread. Some recommended that a new "restoration" category with its own technical standards be created and receive dedicated funding from the Crown, perhaps as a separate pot that could legitimately be called a "sustainable forestry fund".

Participants also rallied around the idea of amending the regulations so that a dedicated portion of the registered buyers' contribution be set aside for uneven-aged treatments as well. They claimed doing so would nudge mills in Nova Scotia to embrace more uneven-aged management, with benefits to the forest and the forest economy. If the mills were "pushed a little" at first, they might develop more familiarity with selection management, and be more likely to apply it broadly.

A number of people thought that registered buyers should be required to perform or fund more Category 7 work, even on a trial basis. Support was aired for funnelling monies dedicated to Category 7 and restoration work through an entity that has a better understanding and appreciation for uneven-aged and restoration management than ASF is perceived to have. Some participants identified the Nova Scotia Woodlot Owners and Operators Association as an organization that could play such a role.

Recommendations: Administration and Funding

17. DNR should re-evaluate the amount of credits provided per hectare of Category 7 silviculture work, and increase that amount to a level that consistently covers the real cost of conducting those treatments.

18. The number of credits that can be initially claimed for Category 7 work should be increased to recognize that the cost of the initial entry typically exceeds that of subsequent entries.

19. All contributions to the Sustainable Forestry Fund should be dedicated to Category 7 treatments.

20. DNR should require registered buyers to allocate a minimum portion of their required silviculture work to Category 7 treatments.

21. DNR should explore a formal partnership with the Nova Scotia Woodlot Owners and Operators Association to administer Category 7 funding from the Sustainable Forestry Fund.

4. Conclusion

This report, a product of a workshop, interviews, and supplementary research, is an initiative by the Ecology Action Centre's Standing Tall campaign for environmentally responsible forestry. Its aim is to help Nova Scotia's Forest Sustainability Regulations do a better job of supporting uneven-aged forestry. Uneven-aged forest management, using selection harvesting, crop tree release, and other treatments, is the most appropriate approach for the majority of Nova Scotia's Acadian forests. Uneven-aged forestry is also needed to help Nova Scotia's forestry sector diversify into value-added processing of products like valuable hardwood sawlogs.

Uneven-aged management is rarely practiced in Nova Scotia, especially compared to even-aged treatments like clearcutting, planting and spraying. Contractors, landowners, and wood processors who want to practice good forestry in the form of uneven-aged silviculture told us that many of the challenges they face could be alleviated with changes to the Regulations' technical standards as well as funding mechanisms. Our recommendations, which focus on these two themes, do not propose an overhaul of the Forest Sustainability Regulations. Rather, they suggest relatively straightforward ways to make uneven-aged forestry more feasible and widespread in Nova Scotia.

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APPENDIX 1: Schedule 1 - Technical Standards

Forest Sustainability Regulations

General requirements for all silviculture categories

1 No site where silviculture has been conducted can be submitted under more than one silviculture category in any given year, except for the following silviculture category combinations:

(a) 1 and 3;
(b) 2 and 3;
(c) 6 and 7(b);
(d) 7(a) and (b);
(e) (e) or 7(b) and (c),

which can be submitted for the same year.

2 Only silviculture undertaken subsequent to January 1, 1998, is eligible.

3 No site where silviculture has been conducted and the credit has been claimed can be reclaimed in the same silviculture category during the life of the forest stand on that same site, except for categories 7(a) and (c) where minimum reclaim periods apply.

4 For a silviculture program to be considered as a softwood or hardwood program, the following conditions apply:

Hardwood silviculture program	
	Sites must contain 25% or greater hardwood commercial species of trees on each site
	limited to Silviculture Categories 1, 5, 6, and 7
Softwood silviculture program	
	all softwood silviculture program sites must contain 25% or greater softwood commercial species of trees on each site
	all silviculture categories apply to the softwood silviculture program.

Silviculture Category	**Technical Standard for Completed Silviculture**		
Minimum	**Maximum**	**Limitations**	
1. Natural Regeneration Establishment: a) Regeneration and fill plant less than 500/ha b) Regeneration and fill plant 500/ha or greater	(a) **Regeneration and fill plant less than 500/ha** • the site must contain at least 1500 commercial crop trees per hectare • the minimum acceptable stocking level of commercial crop trees on the site is equivalent to 80% at 2.4 x 2.4 m spacing • the height of commercial crop trees must be 10 cm or greater	**(a) Regeneration and fill plant less than 500/ha** • the average height of commercial softwood species for the site must be 2 m or less • the average height of commercial hardwood species for the site must be 6 m or less	**(a) Regeneration and fill plant less than 500/ha** • commercial crop tree species must be listed by percent for each site • average height in meters of the listed commercial crop tree species must be submitted for each site
(b) Regeneration and fill plant 500/ha or greater • the site must contain at least 1500 commercial crop trees per hectare • the minimum acceptable stocking level of commercial crop trees on the site is equivalent to 80% at 2.4 x 2.4 m spacing • the height of commercial crop trees must be 10 cm or greater • the site must contain at least 500 living planted trees per hectare to qualify under this category	**(b) Regeneration and fill plant 500/ha or greater** • the average height of commercial softwood species for the site must be 2 m or less • the average height of commercial hardwood species for the site must be 6 m or less	**(b) Regeneration and fill plant 500/ha or greater** • commercial crop tree species must be listed by percent for each site • average height in meters of the listed commercial crop tree species must be submitted for each site	

2. Plantation Establishment	• the site must contain at least 1500 living planted/natural softwood commercial crop trees per hectare • the minimum acceptable stocking level of commercial softwood crop trees on the site is equivalent to 85% at 2.4 x 2.4 m spacing • the site must contain at least 900 living planted trees per hectare to qualify under this category	• the maximum acceptable stocking level of naturally regenerated commercial softwood crop trees on the site is equivalent to 50% at 2.4 x 2.4 m spacing	• commercial softwood crop tree species must be listed by percent for each site • a plantation establishment site may be submitted for a silviculture credit in the year in which it was planted • this category can only be claimed for softwood species
3. Early Competition Control	• the site must contain at least 1500 living planted/natural commercial softwood crop trees per hectare that are released on the site • the minimum acceptable stocking level of commercial crop trees on the site is be equivalent to 80% for natural stands and 85% for plantations, at 2.4 x 2.4 m spacing • plantation sites must contain a minimum of 900 planted trees per hectare that are released on each site		• commercial softwood crop tree species must be listed by percent for each site • this category applies to both natural stands and plantations • evidence of manual or chemical treatment is required • average height in meters of the listed commercial crop tree species must be submitted for each site
4. Density Control and Release in Plantations	• the average height of softwood crop trees on the site must be at least 2 m • the number of commercial softwood crop trees on the site must be at least 1500 per hectare • the minimum acceptable stocking level for commercial softwood crop trees is equivalent to 85% at 2.4 x 2.4 m spacing • the site must have evidence of at least 8000 cut trees per hectare to qualify for this category	• the average height of trees on the site must not be greater than 6 m • the number of commercial softwood crop trees on the site must not be greater than 3500 per hectare	• commercial softwood crop tree species must be listed by percent for each site • this category can be claimed for a silviculture credit for softwood plantations only • average height in meters of the listed commercial crop tree species must be submitted for each site

5. Density Control and Release in Natural Stands	**Tree Height - Softwood:** • the average height of crop trees on the site must be at least 2 m **Tree Height - Hardwood:** • the average height of crop trees on the site must be at least 6 m **Stand Density:** • the number of commercial crop trees on the site must be at least 1500 per hectare **Stocking:** • The acceptable level of stocking of commercial crop trees on the site must be equivalent to 80% at 2.4 x 2.4 m spacing	**Tree Height - Softwood:** • the average height of crop trees on the site must be no greater than 7 m **Tree Height - Hardwood:** • the average height of crop trees on the site must be no greater than 9 m **Stand Density:** • the number of commercial crop trees on the site must be less than 3500 per hectare	• commercial crop tree species must be listed by percent for each site • this category can be claimed for a silviculture credit for naturally established stands only, not previously claimed plantation sites • average height in meters of the listed commercial crop tree species must be submitted for each site
6. Commercial Thinning	• post-treatment residual basal area for softwood silviculture sites must be no less than 18 m^2 per hectare • post-treatment residual basal area for hardwood silviculture sites must be no less than 16 m^2 per hectare	• post-treatment residual basal area for softwood silviculture sites must be no greater than 30 m^2 per hectare • post-treatment residual basal area for hardwood silviculture sites must be no greater than 24 m^2 per hectare	• commercial crop tree species must be listed by percent for each site • the basal area of remaining commercial crop trees shall comprise not more than 50% of balsam fir, and not more than 25% of poplar and red maple combined • average height in meters of the listed commercial crop tree species must be submitted for each site

7. Forest Quality Improvement: a) Crop tree release b) Crop tree pruning c) Selection management in tolerant softwood, mixed wood or hardwood stands	**a) Crop trees released** • the number of commercial crop trees released must be at least 125 per hectare • the average diameter measured at 1.3 m from ground of a released commercial crop tree must be at least 15 cm		**a) Crop trees released** • commercial crop tree species must be listed by percent for each site • acceptable crop tree species include sugar maple, yellow birch, white ash, red oak, eastern white pine, red pine, white birch, red spruce • crop tree crowns must be released on at least 3 sides • a silviculture credit cannot be claimed for the same site more than once in a 10 year period • released crop trees must be marked for identification on each site • average height in meters of the listed commercial crop tree species must be submitted for each site
	b) Crop trees pruned • the number of commercial crop trees pruned must be at least 125 per hectare • the pruned height of a crop tree must be at least 5 m • the average height of commercial crop trees must be at least 8 m		**b) Crop trees pruned** • commercial crop tree species must be listed by percent for each site • acceptable commercial crop tree species include sugar maple, yellow birch, white ash, red oak, eastern white pine, red pine, white birch • average height in meters of the listed commercial crop tree species must be submitted for each site

	c) Selection management in tolerant softwood, mixed wood or hardwood stands **Post-treatment basal area:** • must be more than 15 m^2 per hectare for commercial crop trees on the site **Number of height classes post- treatment:** • there must be 3 height classes or more on the site with a minimum difference of 3 m in average height between height classes, except for regeneration classes where there must be a difference in average height of at least 2 m **Stocking of crop trees:** • the minimum acceptable stocking level for commercial crop trees is 80% at 2.4 x 2.4 m or equivalent spacing for each site **Spacing of crop trees:** • the minimum acceptable spacing for softwood species at a height of 2 m to 6 m or less is 1.8 m • the minimum acceptable spacing for hardwood species at a height of 6 m to 9 m or less is 1.8 m	**c) Selection management in tolerant softwood, mixed wood or hardwood stands** **Post-treatment basal area**: • must be less than 26 m^2 per hectare for commercial crop trees on the site	**c) Selection management in tolerant softwood, mixed wood or hardwood stands** • commercial crop tree species must be listed by percent for each site • a silviculture credit cannot be claimed on the same site more than once in a 10 year period • average height in meters of the listed commercial crop tree species in the upper canopy must be submitted for each site

Table amended: O.I.C. 2004-5, N.S. Reg. 2/2004.

Appendix 2

The Forest Sustainability Regulations: A Questionnaire

The Forest Sustainability Regulations (FSR) have been in effect for 5 years. The Ecology Action Centre, as part of its Standing Tall forestry project, is interested in finding out how well they support ecologically sustainable forest management practices. In order to prepare a workshop and a report on the subject, we would very much appreciate your answering the following brief questionnaire. All responses will be treated as confidential.

1. If you have had experience with the support available for uneven-aged or restoration forestry under the FSR, would you tell us about your experience? (For example, was the application process straightforward? Were you satisfied with the decision made on your application? Does the program adequately cover the treatments you would prescribe?)

2. If you have experienced problems with the program, or if you have not applied because you do not believe that it supports the treatments you would prescribe, would you please list the top 3 difficulties you perceive with applying the Forest Sustainability Regulations towards uneven-aged management or restoration forestry.

3. What suggestions do you have to improve the Forest Sustainability Regulations and/or the administration of the silviculture credits?

We welcome additional comments. Would you be willing to participate in a phone interview?

Name: _____ Tel.: _____